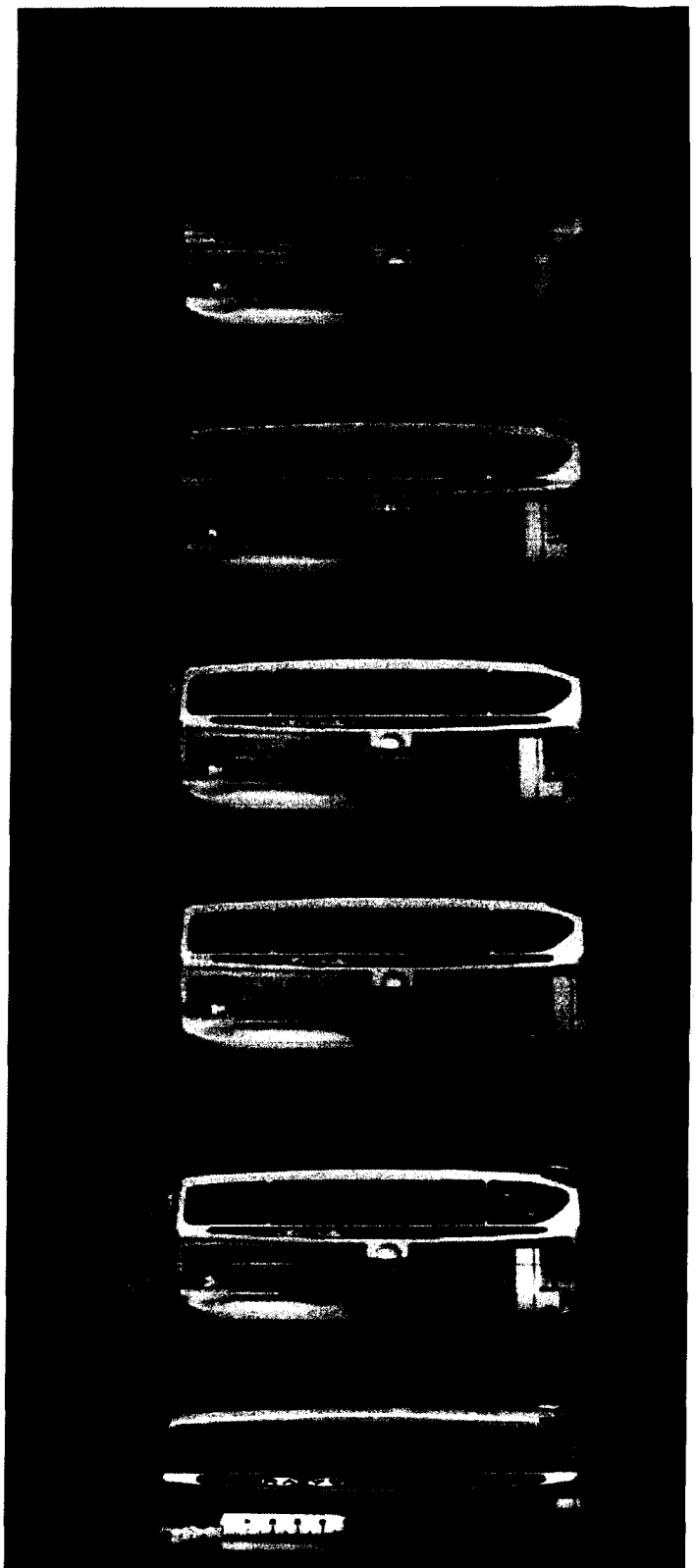
Asena

Medication Safety Systems



Asena® Syringe Pumps

Technical Service Manual

1000SM00001
Issue 7

ALARIS® MEDICAL SYSTEMS | Medication Safety at the Point of Care™

This manual has been prepared for use by qualified service personnel only. ALARIS Medical UK Ltd cannot accept any liability for any breakdown or deterioration in performance of parts or equipment resulting from unauthorised repair or modification.

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Contents

Chapter 1

Initiation

In this chapter

Introduction

The Asena® Syringe Pumps are designed to deliver a continuous and accurate infusion whenever small fluid volumes need to be administered with great precision. High performance, comprehensive alarm protection and sophisticated monitoring systems combined with simple operation make these syringe pumps suitable for both general and critical infusions in a variety of areas within a hospital.

Familiarity

Ensure that you are fully familiar with this syringe pump by carefully studying the Directions for Use (DFU) prior to attempting any repairs or servicing.
As part of a policy of continuous improvement, product enhancements and changes are introduced from time to time.

Purpose

This Technical Service Manual shows how to set up, test and maintain the following Asena® Syringe Pump models:
Asena® GS Syringe Pump
Asena® GH Syringe Pump & Asena® GH Syringe Pump with Guardrails® Safety Software
Asena® CC Syringe Pump & Asena® CC Syringe Pump with Guardrails® Safety Software
Asena® TIVA Syringe Pump
Asena® PK Syringe Pump
Asena® EP Syringe Pump with Guardrails® Safety Software
It is intended for use by personnel experienced in medical equipment testing and maintenance procedures.

Symbols

Wherever you see this symbol in the manual you will find a Hints & Tips note that we hope you will find useful. These notes provide useful advice or information that may help you perform the task more effectively.

Wherever you see this symbol in the manual you will find a Toolbox note that highlights an aspect of test or maintenance that is important for you to know about. A typical example is a software upgrade that you should check has been installed.

General precautions

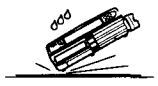
Please read the general Operating Precautions described in the Directions for Use carefully prior to using the pump.

This pump contains static-sensitive components. Observe strict precautions for the protection of static sensitive components when attempting to repair and service the pump.

An explosion hazard exists if the pump is used in the presence of flammable anaesthetics. Exercise care to locate the pump away from any such hazardous sources.

An electrical shock hazard exists if the pumps casing is opened or removed. Refer all servicing to qualified service personnel.

This pump is protected against the effects of high energy radio frequency emissions and is designed to fail safe if extremely high levels of interference are encountered. Should false alarm conditions be encountered, either remove the source of the interference or regulate the infusion by another appropriate means.



If the pump is dropped, subjected to excessive moisture, humidity or high temperature, or otherwise suspected to have been damaged, remove it from service for inspection by qualified service personnel.

When connected to an external power source, a three-wire (Live, Neutral, Earth) supply must be used. If the integrity of the external protective conductor in the installation or its arrangement is in doubt, the pump should be operated from the battery.

Service contacts

For service, contact your local ALARIS Affiliate Office or Distributor.

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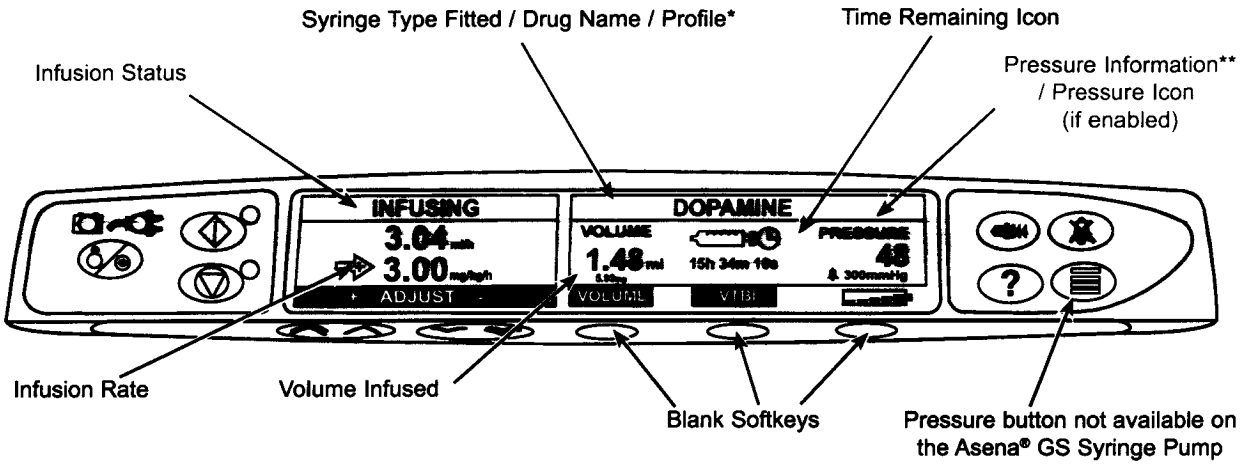
Document history

Part Number	*Issue*	*CO No.*	*Date*	*Description of Change*	*Changed by*
1000SM00001	1	4091	19/Dec/02	Initial release	Ian Tyler
		(1000SM00001 supersedes 1000PB01120)			
1000SM00001	2	4268	14/Jan/03	See Appendix E Updates	Ian Tyler
1000SM00001	3	4432	24/Apr/03	See Appendix E Updates	Ian Tyler
1000SM00001	4	4710	10/Jun/04	See Appendix E Updates	Ian Tyler
1000SM00001	5	5478	27/Sep/04	See Appendix E Updates	Ian Tyler
1000SM00001	6	5688	6/Apr/05	See Appendix E Updates	Ian Tyler
1000SM00001	7	5920	20/Apr/05	See Appendix E Updates	Ian Tyler

Front panel and main display

The display shown is for general guidance only. For pump specific front panel and main display information refer to relevant Directions For Use.



* "Profile" is only available on an Asena® Syringe Pump with Guardrails® Safety Software with a Data Set loaded.
** Pressure Information is only displayed on the Asena® CC Syringe Pump and Asena® EP Syringe Pump.

Controls and indicators

ON/OFF - Press once to switch the pump ON. Press and hold down for 3 seconds to switch the pump OFF.

RUN - Press to start the infusion. The Green LED will flash during infusion.

HOLD - Press to put the infusion on hold. The amber LED will be lit while on hold.

MUTE - Press to silence alarms.

PURGE/BOLUS - Press to access **PURGE** or **BOLUS** softkeys. Press and hold down softkey to operate. **PURGE** the extension set during setup. Pump on hold, extension set not connected to patient, VI not added. **BOLUS** delivered at an accelerated rate. Pump infusing, extension set connected to patient, VI added.

OPTION - Press to access optional features.

PRESSURE - Press to display the pumping pressure and alarm level.

BLANK SOFTKEYS - Use in conjunction with the prompts shown on the display.

CHEVRONS - Double or single for faster/slower, increase or decrease of values shown on main display.

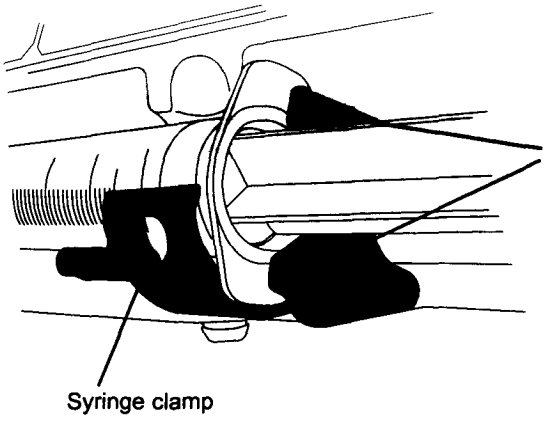
BATTERY - When illuminated, indicates that the pump is running on the internal battery. When flashing, indicates that the battery power is low, with less than 30 minutes of use remaining.

AC POWER - When illuminated, indicates that the pump is connected to an AC power supply and the battery is being charged.

Loading a syringe

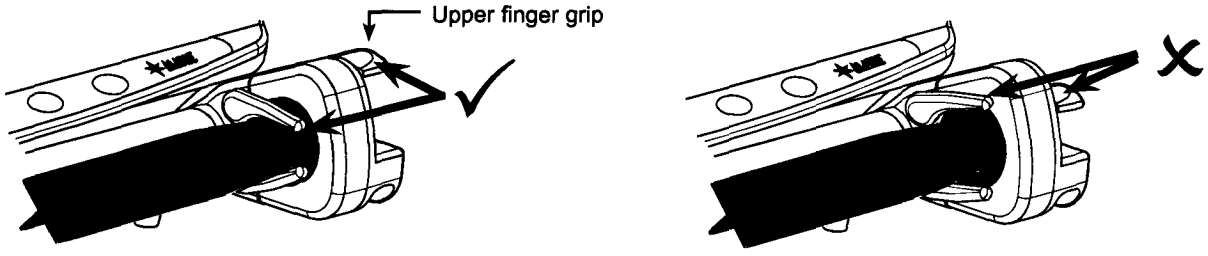
1. Squeeze the finger grips together on the plunger holder and slide the mechanism to the right. Pull the syringe clamp forward and down.
2. Place the syringe barrel flange in the slot between the two blue sections of the syringe flange clamp.

Note: Earlier pumps have a single section syringe flange clamp. In this instance place the syringe barrel flange in the space between the syringe clamp and the syringe flange clamp.



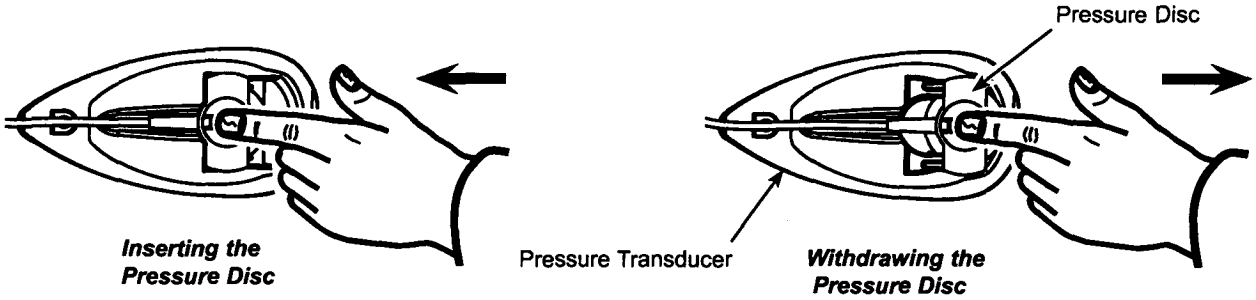
To ensure the syringe is loaded correctly, check the syringe remains in position before the syringe clamp is closed.

3. Lift the syringe clamp until it locks against the syringe barrel.
4. Squeeze the finger grips on the plunger holder and slide the mechanism to the left until it reaches the plunger end.
5. Release the finger grips. Ensure that the plunger grippers are securing the plunger in place and the upper finger grip returns to its original position.



Ensure that both plunger grippers are fully locked onto the plunger flange and the upper finger grip has returned to its original position.

Guide to handling the pressure disc



When withdrawing the pressure disc, make sure you pull it (with your finger inside the disc recess) towards the front of the pump as shown in the diagram above.

Starting the pump

1. Push pump on to bar, the Asena® Docking Station or mount to pole. Connect to AC Mains.
2. Press the ⏻ button to switch pump ON.
3. Follow SETUP / Drug / Profile instructions as per Directions For Use.
4. Load syringe.
5. Insert pressure disc into pressure transducer (Models CC & EP only, required for dedicated mode).
6. Confirm syringe.
7. Change the rate if necessary using the ▲▼ keys.
8. Purge: Press the ⏩ button followed by the **PURGE** softkey.
9. **Connect the pump to test equipment as required (see chapter 2 Configuration & Calibration).**
10. **Press the ▶ button to start the infusion.**

Basic features

Pressure Level (not available on Model GS)	Press the ▣ button. Pressure Alarm level and current pressure level are shown on graph. Use the ▲▼ keys to adjust pressure alarm level.
Volume to be Infused (not available on Models TIVA & GS)	Press **VTBI**. Enter VTBI using the ▲▼ keys. Press **OK**. Select rate at end of VTBI using the ▲▼ keys. Press **OK**.
Clear Volume Infused	Press **VOLUME**. Select **YES** (to clear) or **NO** (to exit).
Purge/Bolus	Press the ⏩ button, use the ▲▼ keys to set rate, then press and hold down the **PURGE** or **BOLUS** softkey.
Hands-free Bolus* (Model TIVA only)	Press the ⏩ button, if required, select **HANDSFREE BOLUS**, use the ▲▼ keys to adjust bolus dose. Use rate softkey to adjust bolus rate if required. Press **BOLUS** softkey to deliver.

During PURGE/BOLUS, the pressure limit alarms are temporarily increased to maximum levels.

Option Button ?

Drug Library*	Select Drugs and Dosing (Models CC & TIVA) or Drug name (Model GH).
Set VTBI Over Time	Specify a VTBI and delivery time *(not available on Models TIVA & GS).* Pump must be on hold.
24 Hour Log	Volume infused log over 24 hours and accumulative total (on the hour only).
Rate Lock	Disables changing rate once infusion has started *(not available on* Model *TIVA).*

When rate lock is enabled, the following are unavailable:

1. Rate changes/titration

2. Bolus/Purge

3. Switch pump off

Event Log*	Access Event Log. The Event Log holds up to 1500 individual events. Pumps with Guardrails® Software enabled retain one year of events.
Hospital Name*	Displays the name of Hospital/Ward/Department as set up on the pump. Accessible while the pump is infusing.

Additional options may be shown, please refer to the relevant Directions For Use, for more information.

*** Note:** For Guardrails® Software enabled pumps or the Asena® PK Syringe Pump these options may vary or will not be available. Please refer to the relevant Asena® Syringe Pump Directions For Use or Guardrails® Editor Software Directions For Use for comprehensive information.

Chapter 2

Configuration & Calibration

In this chapter

Access codes

The syringe pump software contains a number of configuration and test routines that can be accessed by the user. The majority of tests are 'MENU' driven from a technical access code (see below).

Code	Description
123	Self Test Procedure
166	External Reprogramming
167	Teach Learn Procedure
243	Calibration Selection Menu
251	User Configuration Menu
301	Fully Dedicated
302	Semi-dedicated
376	Service Access Menu
401	Upload Data Set to Pump (Guardrails® Software enabled Pumps and the Asena® PK Syringe Pump)
402	Download CQI Event Log from Pump (Guardrails® Software enabled Pumps only)
418	Alternative Alarm Tone. (Not available for Guardrails® Software enabled Pumps and the Asena® PK Syringe Pump)
499	Download Data Set from Pump (Guardrails® Software enabled Pumps and the Asena® PK Syringe Pump)
611	Cold Start (RAM Clear)
612	Data Set activitation (Asena® PK Syringe Pump)

Each MENU (and some unique items) has its own three-digit access code that can be entered using the following procedure:

1. Hold down ⏻ and turn the pump ON.
2. Enter the required access code using the ▲▼◀▶ keys and the **NEXT** softkey.
3. When the required code shows on screen, press **OK** to confirm.

Dedication options (301/302)

Fully Dedicated (set using access code **301**) will remind a user that a pressure disc must be fitted to start any infusion. In this mode occlusion pressures are always displayed in mmHg.

Semi-Dedicated (set using access code **302**) will remind a user that a pressure disc must be fitted when drugs and dosing features are used. When a pressure disc is not in use, pressure levels L-0 to L-10 will be displayed.

Data Set Activiation (612)

This code is used to load the predefined pump configuration and drug setup into the non-volatile storage. It is necessary to enter the code **612** after a cold start (code **611**); the configuration and drug setup will then be available in normal operation.

Alternatively a data set may be uploaded as appropriate. See directions for use contained within the Asena® PK Editor Software package.

Configuration options (251)

Enter access code **251** to display the User Configuration menu:

Drug Library*	Set drug names list on a Model GH - Select Character Group ▲▼ Select Character ◀▶ To go to next Character use **NEXT**. Set drug names and protocols for Models CC and TIVA (*see drug protocol setup instructions on following pages*).
General Options*	See table on the following page.
Clock Set	Set the current date and time. To set the clock, use ▲▼◀▶ and **NEXT** to adjust and **OK** to store.
Hospital Name*	Enables establishment name (max 12 characters) to be displayed during the power-up sequence. To set the hospital name, use ▲▼◀▶ and **NEXT** to adjust and **OK** to store.
Enable Syringes*	Configure the type and size of syringes permitted for use. To enable syringes, use ▲▼◀▶ and **SELECT**, to enable/disable and **OK** to store.
Language	Configure the language used for messages shown on display. Select language required using ▲▼◀▶ and **SELECT** to store.
Contrast	Set the display panel contrast. Use ▲▼◀▶ to adjust contrast and **OK** to store.
Enable Units*	Select the type of units permitted for use on the pump. To enable units, use ▲▼◀▶ and **MODIFY**, to enable/disable and **OK** to store.

*** Note:** For Guardrails® Software enabled pumps and the Asena® PK Syringe Pump these options may vary or will not be available. Please refer to the relevant Asena® Syringe Pump Directions For Use or Guardrails® Editor Software Directions For Use for comprehensive information.

Configuration options (251) *(continued)*

Asena® TIVA Syringe Pump drug protocol setup

Select Drug Library from Configuration Options (**251**).

Use ⏶⏷ to select drug and press **MODIFY** to modify selected drug or **NEW** to create new drug name.

QUIT will return to **251** main menu.

When modifying a drug protocol, pressing **BACK** at any time will take you to the previous step.

Modify - Existing drug

ENABLE/DISABLE - Enables or disables the drug being available.

DELETE - Select Yes to delete from drug library.

EDIT - See table below.

Edit Drug Protocol - New or existing drug

Press **OK** softkey to confirm each step.

Drug Option	**To Adjust** (Softkeys are shown in **Bold**)
Drug Name	Select Character Group ⏶⏷ Select Character ⏴⏵ To go to next Character **NEXT**
Concentration Units	⏶⏷
Minimum Concentration	⏶⏷ or **OFF**
Default Concentration	⏶⏷ or **OFF**
Maximum Concentration	⏶⏷ or **OFF**
Dose Rate Units	⏶⏷
Induction Dose	⏶⏷ or **OFF**
Induction Time	⏶⏷
Pause After Induction	**MODIFY**
Maintenance Rate	⏶⏷
Bolus Dose	⏶⏷
Bolus Rate	**RATE**
Hands Free Bolus	**MODIFY**

Configuration options (251) *(continued)*

Asena® CC Syringe Pump* drug protocol setup

Select Drug Library from Configuration Options (**251**).

Use ▲▲▼▼ to select drug and press **MODIFY** to modify selected drug or **NEW** to create new drug name.

QUIT will return to **251** Main menu.

When modifying a drug protocol, pressing **BACK** at any time will take you to the previous step.

Modify - Existing drug

ENABLE/DISABLE - Enables or disables the drug being available.

DELETE - Select Yes to delete from drug library.

EDIT - See table below.

Edit Drug Protocol - New or existing drug

Press **OK** softkey to confirm each step.

* **Note:** For Guardrails® Software enabled pumps this option will not be available. Please refer to the relevant Asena® Syringe Pump Directions For Use or Guardrails® Editor Software Directions For Use for comprehensive information.

Drug Option	**To Adjust** (Softkeys are shown in **Bold**)
Drug Name	Select Character Group ▲▲▼▼ Select Character ◄◄►► To go to next Character **NEXT**
Dose Rate Units	▲▲▼▼
Maximum Dose	▲▲▼▼ or **OFF**
Default Dose	▲▲▼▼ or **OFF**
Minimum Dose	▲▲▼▼ or **OFF**
Concentration Units	▲▲▼▼
Minimum Concentration	▲▲▼▼ or **OFF**
Default Concentration	▲▲▼▼ or **OFF**
Maximum Concentration	▲▲▼▼ or **OFF**
Maximum Bolus	▲▲▼▼ or **OFF**
Bolus Rate	▲▲▼▼
Pressure Alarm	▲▲▼▼ or **OFF**

Configuration options (251) *(continued)*

General options

Option	Description	Models			
		GS	GH*	CC*	TIVA
NURSE CALL FITTED	Enables Nurse Call (hardware option).	✓	✓	✓	✓
NURSE CALL INVERT	When enabled, the nurse call output is inverted.	✓	✓	✓	✓
RS232 SELECTED	Sets the pump's communications to use RS232 (hardware option).	✓	✓	✓	✓
NEOI WARNING	Sets the Near End Of Infusion (NEOI) warning time.	✓	✓	✓	✓
EOI POINT	Sets the End Of Infusion volume.	✓	✓	✓	✓
KVO AT EOI	Enables pump to run at the Keep Vein Open (KVO) rate when End Of Infusion (EOI) is reached.	✓	✓	✓	✓
KVO RATE	Sets the Keep Vein Open (KVO) rate.	✓	✓	✓	✓
BACK OFF	Motor will reverse to relieve line pressure when an occlusion occurs.	✓	✓	✓	✓
AUTO SAVE	When disabled, the patient information is cleared on power up.	✓	✓	✓	x
RATE LOCK	When enabled, the rate can be locked to prevent unwanted changes of the set infusion rate.	✓	✓	✓	x
QUIET MODE	When enabled, the button beeps are muted.	✓	✓	✓	x
AC FAIL	When enabled, the AC Power Failure Alarm will sound if AC power is disconnected.	✓	✓	✓	✓
RATE TITRATION	When enabled, the rate can be changed whilst the pump is infusing.	x	✓	✓	x
PRESSURE DISPLAY	Enables / disables the Pressure Icon on the main display.	✓	✓	✓	✓
AUTO PRESSURE	Enables / disables the automatic pressure alarm level option.	x	x	✓	x
AUTO SET PRESSURE	Automatically sets the line occlusion pressure alarm level to a specified amount above the current pressure.	x	x	✓	x
AUTO OFFSET	Adjusts the automatic offset value used by auto pressure and auto set pressure.	x	x	✓	x
HANDS FREE BOLUS	Enables / disables hands-free bolus.	x	x	x	✓
CAP PRESSURE	Sets the maximum pressure limit.	x	✓	x	x
PRESSURE DEFAULT	Sets the default occlusion alarm level.	✓	✓	✓	✓
DEFAULT BOLUS VOLUME	Sets the default hands-free bolus volume for No Drug mode only.	x	x	x	✓
MAX PRESSURE	Sets the maximum pressure limit.	x	x	✓	x
WEIGHT	Sets the default patient weight in kg.	x	x	✓	✓
CAP RATE	Sets the maximum value for infusion rate.	✓	✓	✓	x
PURGE RATE	Sets the purge rate.	✓	✓	✓	✓
PURGE VOLUME LIMIT	Sets the maximum permissible purge volume.	✓	✓	✓	✓
PURGE SYRINGE	Prompt to purge syringe after confirmation.	✓	✓	✓	✓
BOLUS	Enables / disables the bolus feature.	✓	✓	✓	x
DEFAULT BOLUS	Sets the default bolus rate.	✓	✓	✓	✓
CAP BOLUS RATE	Sets the maximum value for bolus rate.	✓	✓	✓	x
BOLUS VOL LIMIT	Sets the maximum permissible bolus volume.	✓	✓	✓	x
MANUAL BOLUS	Volume infused will be increased if plunger is manually moved in and syringe remains confirmed.	✓	✓	✓	✓
CALL BACK TIME	Adjusts the time for the pump to sound the call back alarm.	✓	✓	✓	✓
VTBI CLEAR RATE	Rate will be set to zero when VTBI has been set-up with stop as the end rate.	x	✓	✓	x
EVENT LOG DISPLAY	Enables / disables the event log display.	✓	✓	✓	✓
BATTERY ICON	Enables / Disable the Battery Icon on the main display.**	✓	✓	✓	✓
AUDIO VOLUME	Sets the alarm volume of the pump at high, medium or low.	✓	✓	✓	✓

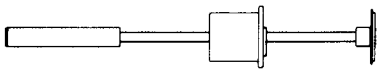
Key:
✓ = available option
x = unavailable option

* For Guardrails® Software enabled pumps and the Asena® PK Syringe Pump these options may vary or will not be available, with only the first three options listed in table above adjustable in the General Options on the pump. Please refer to the relevant Asena® Syringe Pump Directions For Use or Guardrails® Editor Software Directions For Use for comprehensive information.
** For Asena® GS Syringe Pump the battery icon can be seen via the Options menu by pressing the ⑦ key.

Calibration procedures (243)

Enter access code **243** to display the Calibration Selection menu (see Access Codes).

SYRINGE CLAMP calibration



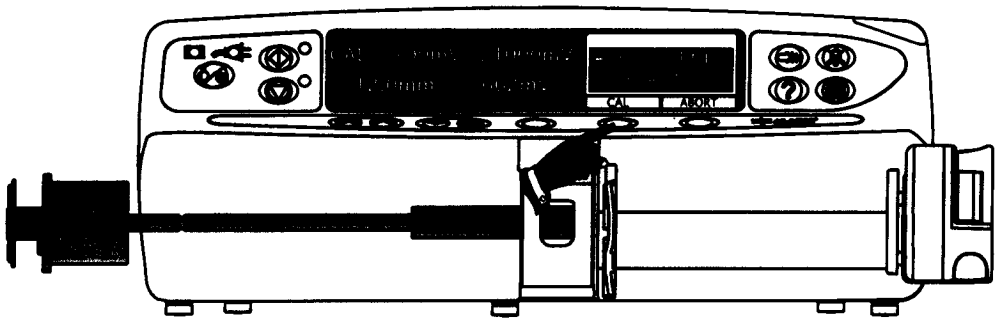
Calibration tool required: 1000TG00095

Fit calibration tool into position on pump as shown in Steps 1-2 and close the clamp. At each step, CAL is displayed if value is within tolerances.
Press CAL button to store calibration point.

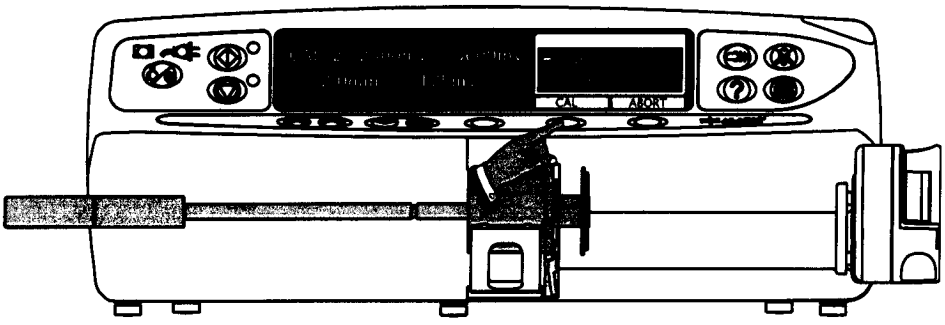
Note: If CAL is not displayed, check for correct positioning of calibration tool.
If calibration cannot be performed, repairs to pump may be necessary.

Note: The calibration values shown on the displays are for illustrative use only and may vary.

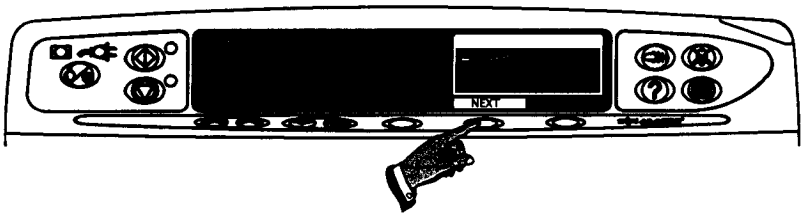
Step 1



Step 2



Step 3



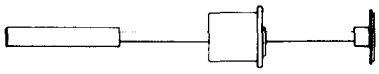
Calibration procedures (243) *(continued)*

PLUNGER POS (position) calibration

Fit calibration tool in position on pump as shown in Steps 1-3. At each step CAL is displayed if value is within tolerance. Press CAL button to store calibration point.

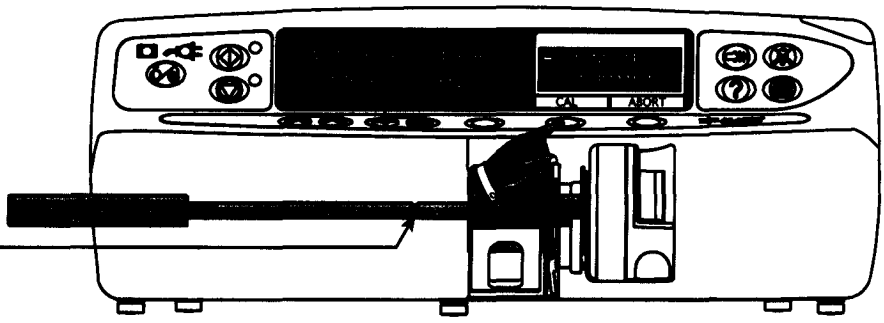
Note: If CAL is not displayed, check for correct positioning of calibration tool. If calibration cannot be performed, repairs to pump may be necessary.

Note: The calibration values shown on the displays are for illustrative use only and may vary.



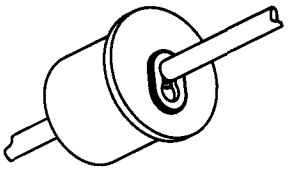
Calibration tool required: 1000TG00095

Step 1

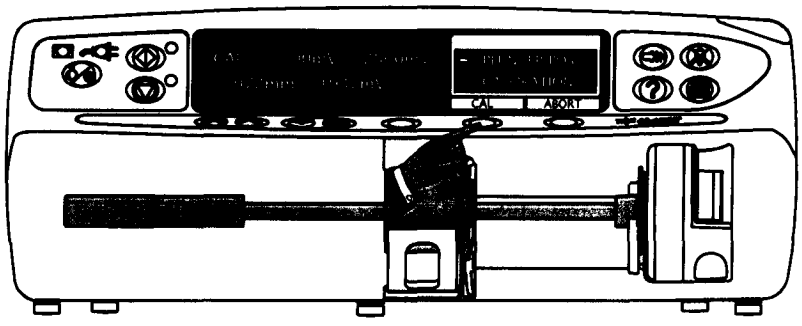


Channel for locking clip

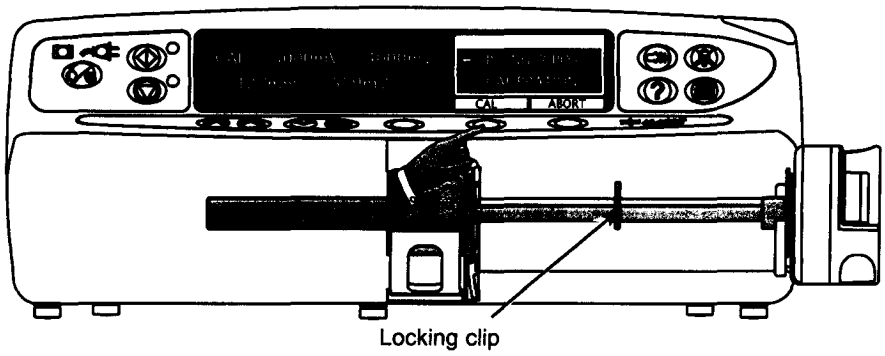
Close-up of calibration tool, showing locking clip in position.



Step 2

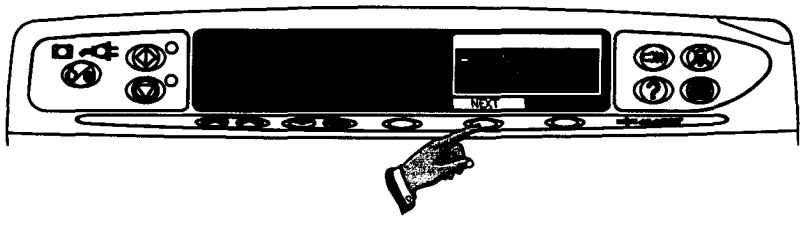


Step 3



Locking clip

Step 4

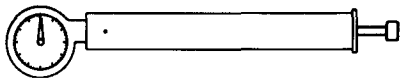


Calibration procedures (243) *continued*

SYRINGE FORCE calibration

Precondition:

This preconditions the mechanism and should only be done if motorplate or chassis has been replaced. Fit Calibration tool as shown, zero the gauge, run until gauge registers 10KgF and then carefully declutch mechanism and withdraw plunger. Do not press any button during this procedure.

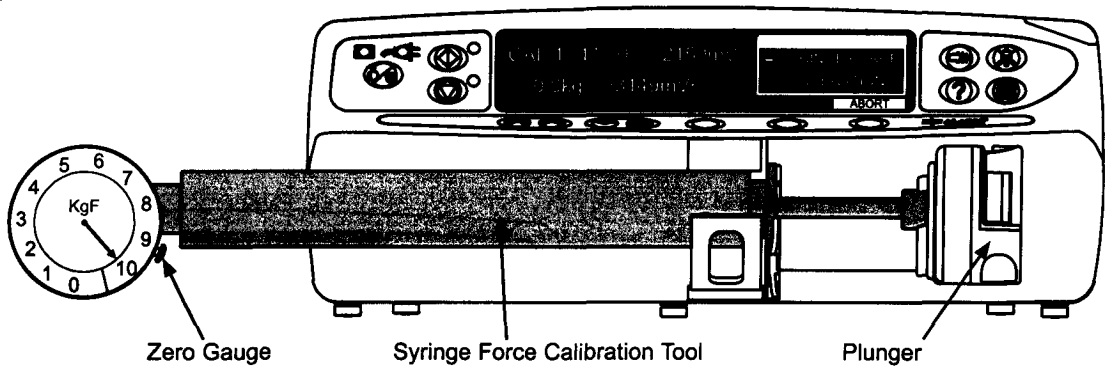


Calibration tool required:
0000TG00020 (shown) or 0000TG00200

Excessive force will damage the plunger mechanism. Do not apply more than 10 KgF ±0.05KgF to the plunger mechanism at any time.

Note: The calibration values shown on the displays are for illustrative use only and may vary.

Precondition
10KgF ±0.05KgF

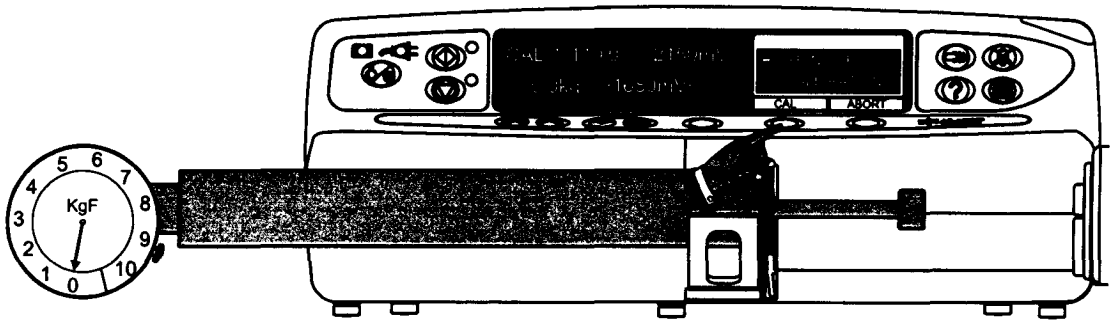


Fit Calibration tool and position plunger as shown in Steps 1 to 3, zero the gauge. At each step press CAL when required calibration force is reached.

Note: If CAL does not appear in display, check for correct positioning of tool. If calibration cannot be performed, repairs to pump may be necessary.

Allow 30 seconds for pressure to stabilise following any preconditioning calibration.

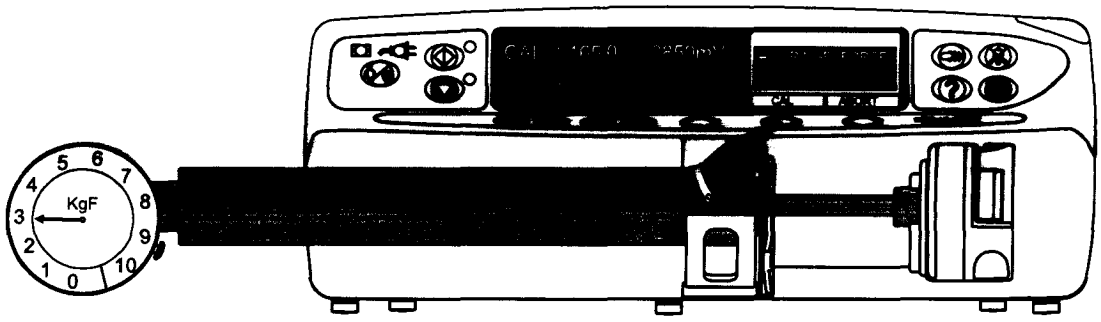
Step 1
0KgF±0.05KgF



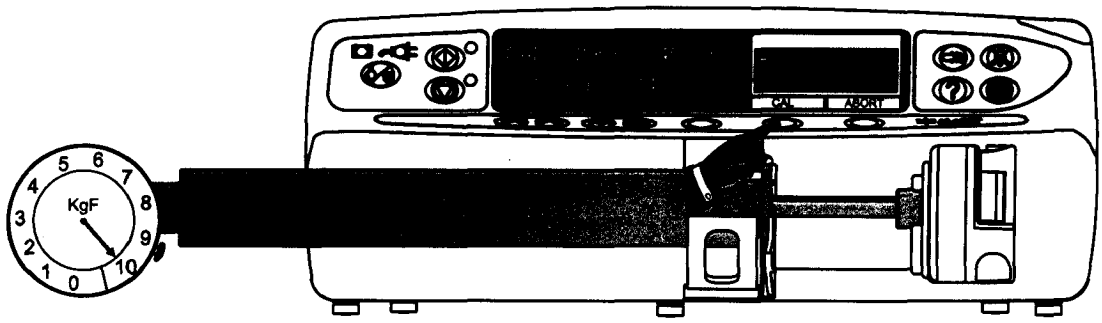
Calibration procedures (243) *(continued)*

SYRINGE FORCE calibration (continued)

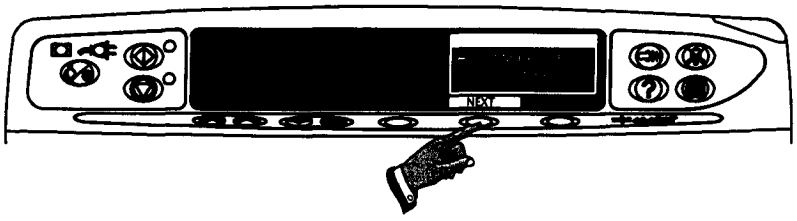
Step 2
3KgF ±0.05KgF



Step 3
10KgF ±0.05KgF



Step 4



Use of the 0000TG00200 Digital Occlusion Testgear.
The 0000TG00200 Occlusion testgear uses a digital force gauge to register applied forces. Please refer to the MecMesin Compact Gauge Operation Instructions supplied for detailed operational information and power options and requirements.

To prepare the testgear for use, load into the syringe pump.
- ***Ensure there is nothing touching the testgear plunger (such as the syringe plunger drive).***
- ***Turn on the Compact Gauge using the 'On/Zero' key.***
- ***Select 'kg' force units, and 'MAX' reading option.***
- ***If the display indicates other than 0.00kg, zero the system using the 'On/Zero' key.***

Operate the system as required for performing the calibration activity.

Before the next use, ensure the 'MAX' reading is cleared using the 'On/Zero' key.

Calibration procedures (243) *(continued)*

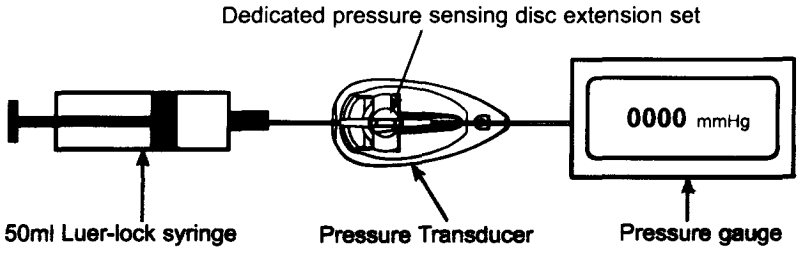
LINE PRESSURE calibration – Asena® CC Syringe Pump & Asena® EP Syringe Pump ONLY

Tools required:

Pressure gauge (range 0-1400 mmHg)
(Tolerance +/- 0.1mmHg)

Dedicated pressure sensing disc extension set
(i.e. G30402)

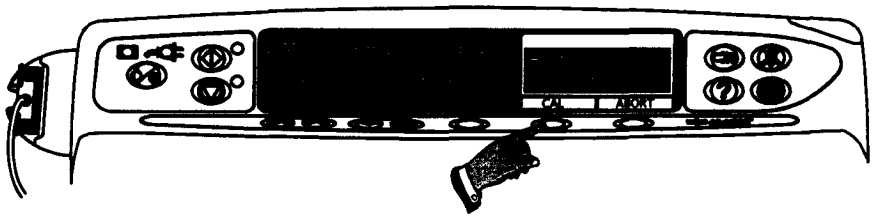
50ml Luer-lock syringe



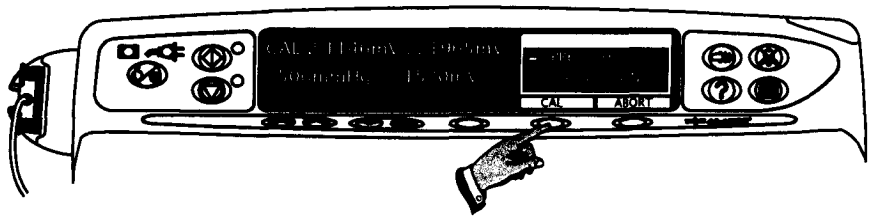
Load pressure disc infusion set into transducer. Connect infusion set to syringe and gauge. Using syringe, apply pressure required as shown at steps 1-3. At each step press CAL when required calibration pressure is displayed on pressure gauge.

Note: The calibration values shown on the displays are for illustrative use only and may vary.

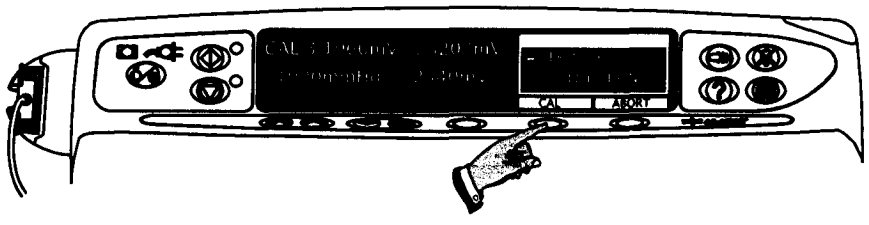
Step 1 **25mmHg ± 1mmHg**



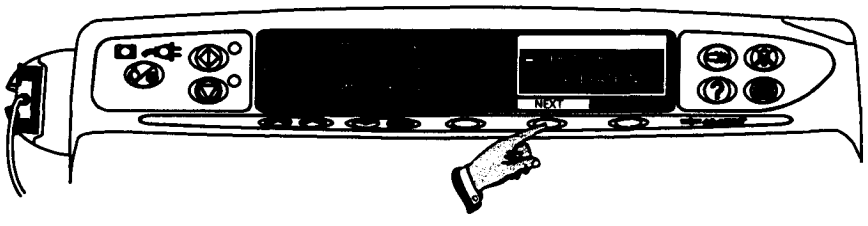
Step 2 **500mmHg ± 1mmHg**



Step 3 **1000mmHg ± 1mmHg**



Step 4



Calibration procedures (243) *(continued)*

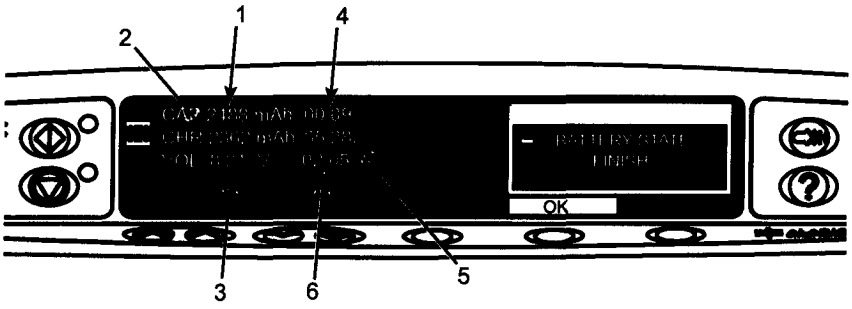
BATTERY calibration

1. Connect the Pump to AC mains.
2. Select BATTERY CALIBRATION from menu and press **OK**.
3. The pump will automatically run the battery calibration. Battery calibration cycles the battery through a charge, discharge and re-charge sequence during which the gas gauge within the battery pack will be updated with a measurement of the current capacity of the cells.

many pumps in close proximity (in a docking station, for example).
Ensure that the battery is supported as you open the battery compartment.

Disconnecting the AC mains at any time during calibration will cause battery calibration to fail.

4. When calibration is complete, the following is shown on the display:



	Value	Description	Pass Criteria
1	Battery Capacity	Pack capacity value updated after measured discharge phase (if changed).	Greater than 2100mAh
2	Current Battery Charge Level	Current charge in pack.	n/a
3	Battery Voltage	Current pack voltage.	n/a
4	Initial Charge Time	Time taken during intial charge phase. Intial charge phase checks pack is fully charged and if not it is charged.	Lower than 2 hours 59 minutes
5	Discharge Time	Time taken during measured discharge phase. Pack is discharged to determine how much charge is available from the pack.	Between 4 hours 15 minutes & 10 hours
6	Final Charge Time	Time taken during final charge phase. Pack is fully recharged ready for use.	Lower than 2 hours 59 minutes

5. All pass criteria (see table above) should be met and the pump should display FINISH at the end of the calibration otherwise calibration has failed. If calibration has failed retry calibration or replace battery.
6. Press **OK** to exit.

The plunger drive will move automatically during the discharge phase, so ensure that the plunger drive is not obstructed during calibration (remove syringes etc).

Chapter 3

Routine Maintenance

In this chapter

For routine maintenance, the following self-test and performance verification procedures should be performed.

Refer to the relevant Directions for Use for the recommended routine maintenance period.

Self-test procedure (123)

Self-tests included in full test

Enter access code **123** to view the Test Selection menu (see Access Codes in chapter 2). Refer to table below for the tests in each menu item.

Test Section	Test	Action
Software	Software info	Displays the software version.
	Data Set Info	Displays the Data Set information. (pumps with Guardrails® Safety Software only)
Safety Processor	Safety ID	Check displays the version of the safety ID.
	Safety LED	Check red LED illuminated.
	Safety Alarm	Check Backup alarm sounds.
Full only	Serial Number	Check displays serial number of unit.
	Language	Check displays correct language.
	Real-time Clock	Check displays correct date and time.
	Service Date	Check displays date when service is next required.
Sensor	Disc Detect	Check the display changes correctly to indicate if a disc is Out or In (Models CC & EP only).
	Line Pressure	Check pressure is 000mmHg +/-20mmHg with no pressure applied (Models CC & EP only).
	Motor Encoder	Check motor runs and Passed is displayed.
	Drive Engage	Check display indicates Drive Engaged or Disengaged when clutched/ declutched.
	Plunger Fit	Check display indicates if the Plunger button is Out or In.
	Plunger Position	Check display smoothly and continuously changes during full plunger travel.
	Syringe Clamp	Insert the syringe size calibration tool (1000TG00095) and check the following values are displayed for diameters inserted: 12mm diameter = 11.5 to 12.5mm 32mm diameter = 31.5 to 32.5mm
	Syringe Force	Check motor runs and syringe force is displayed.
Battery	Battery	Check displays values in CAP, CHR and VOL; no dashes should be seen.
Audio	Audio Speaker	Check the main audible alarm sounds.
Visual Indicator	Display	Check that all of the display pixels are illuminated.
	Backlight	Check that the backlight switches from LOW to HIGH when indicated.
	Battery LED	Check the Battery LED (Amber) flashes.
	Start LED	Check the Start LED (Green) flashes.
	Stop LED	Check the Stop LED (Amber) flashes.
	Warning LED	Check the Warning LED (Amber) flashes.
	Alarm LED	Check the Alarm LED (Red) flashes.
Key	Keypad	Press the key indicated and check changes to next key.
Comms	Comms	RS232 only. Check Nurse call and RS232 operation.

Software fault codes *(continued)*

Code	Module	Failure	Action/Replace
EV1	Event Log	Open log file at power up	Control PCB
EV2		File storage software module	
EV3		Log read index	
EV4		Log write index	
EV5		Log data read	
EV6		Log data write	
EV7		Log data seek	
EV8		Log repair failure	
EV9		Log format failure	
EV10		Log reporting failure	
EV11		Log extracting failure	
EV12		Log pack failure	
EV13		Log unpack failure	
FD1	Fluid Delivery	Fluid delivery software module	Control PCB
FD2		Alarm manager software module	
FD3		Plunger drive software module	
FD4		Pressure monitor software module	
FD5		Syringe software module	
FD6		User configuration software module	
FD7		Fluid delivery setup data retrieval	
FD8		Fluid delivery setup data storage	
FD9		Fluid delivery critical data	
FD11		VI cross check error	
FL1	Fluid Log	Open fluid log file at power up	Control PCB
FL2		File storage software module	
FL3		Log read index	
FL4		Log write index	
FL5		Log data read	
FL6		Log data write	
FL7		Log data seek	
FL8		Log repair failure	
FL9		Log format failure	
FL10		Log reporting failure	
FL11		Log extracting failure	
FL12		Log pack failure	
FL13		Log unpack failure	
GG1	Gas Gauge	Communications with gas gauge	Battery or Control PCB
GR1	Guardrails® Limit	Guardrails® Limit failure	Control PCB
IM1	Identification Manager	Data corrupt	Control PCB
IM2		Serial number to set	Set Serial Number in access code 376
IM3		RTC to set	Set RTC in access code 251. Control PCB
IM4		Storage failure	Control PCB

Software fault codes

The following errors, AE1, DE1, PF1, PP1 and SC1 may be experienced if the self test operation or calibration operation has been accessed by quickly from the configuration menu. If these are displayed the pump should be power cycled and these operations entered directly.

Code	Module	Failure	Action/Replace
AC1	AC Alarm manager	AC alarm manager failure	Control PCB
AC2		AC VCO failure	
AD1	ADC Converter	Voltage reference/Power regulation	Control PCB
AM1	Audio manager	Audio status output driver	Control PCB
AM2		VCO failure	
AS1	Audio Status	Software execution	Speaker, wiring or Control PCB
AS2		Audio status monitoring input ADC	
AS3		Speaker current test at power up	
BT1	Battery	Battery gas gauge	Battery or Control PCB
BT2		Battery cell voltage is low	
BT3		Battery cell voltage is high	
BT4		Battery discharging when connected to mains.	
CK1	Clock	Excessive timing drift	Control PCB
DE1	Drive Engage Detect	Drive engagement software module	Control PCB
DE2		Drive engagement opto self test	Plunger drive flexi, Control PCB or Transmission PCB flexi
DE3		Emitter in wrong state	
DB1	Drugs Manager	*Drug database file system*	Control PCB
DB2		Drug database file retrieval	
DB3		Drug database file storage	
DB4		CRC Error	
DS1	Dosing Manager	Dosing retrieval failure	Control PCB
DS2		Dosing storage failure	
DS3		Dosing data failure	
DS4		Dosing drug library failure	
DS5		Dosing patient data failure	
DS6		Dosing IDFS failure	
DS7		Dosing Data Set manager failure	
DS8		Dosing Profile manager failure	
DSM1	Data Set Manager	Data Set loading failure	Upload or check Data Set
DSM2		Data Set integrity failure	
DSM3		Data Set incompatible format	
DSM4		Data Set CRC failure	
DSM5		Data Set read failure	Upload or check Data Set Control PCB
DSM6		Data Set element CRC failure	
DSM7		Data Set storage failure	Control PCB
DSM8		Data Set storage retrieval failure	
DSM9		Data Set data corruption	

Chapter 4

Troubleshooting

In this chapter

Performance verification procedure

Inspection	**Physical Inspection and Clean**			
Updates[3]	**Recommended When Serviced**	Fitted	Not Fitted	Already Fitted
[redacted]	For models GS, GH & CC upgrade software version to 1.5.10 or higher[1]	_____	_____	_____
[redacted]	Fit transmission buffer pad below 8001- 03469 & 8002 -06789	_____	_____	_____
[redacted]	Fit modified pole clamp arm as required	_____	_____	_____
Error Log 376[1]	Check/Set Serial number, Set Service date (optional)			
Self Test 123[1]	**Perform complete full test** Check Date and Time is correct (set as required 251) [2]			
	Syringe Size Detection Test 12mm spacer (11.5 to 12.5) 32mm spacer (31.5 to 32.5)			
Infusing	**Alarms Functionality Check** Drive Disengaged, Check Syringe, AC power fail, Pressure Disc out (CC & EP), Near End of Infusion, Plunger Location, End of Infusion Ensure Pump works on battery and AC mains			
Verification Tests [1]	**Linear Speed Test*** Pump set to 200ml/h, Syringe type BD 50, for a distance of 15mm 2min 26.23 secs to 2 mins 29.17 secs	_____min _____sec		
	Occlusion Test Pump set to 100ml/h, Syringe type BD 50, Alarm level L – 3 2.7KgF to 3.3KgF **OR** Dedicated Models CC & EP, alarm level set to 200mmHg, drive occlusion at 2.7KgF to 3.3KgF	_____KgF **OR** _____KgF		
	Line Pressure Readings (Models **CC & EP**) Alarm set to 50mmHg – pump alarms 40mmHg to 60mmHg Alarm set to 750mmHg – pump alarms 710mmHg to 790mmHg	_____ mmHg _____ mmHg		
Set Up	**Set Rate to Zero (or lowest value possible), clear Volume infused and VTBI** **Clear Error/Alarm/Battery logs (As required)**			
Electrical safety test	**Class I Type CF** - *Alternatively attach printed test results* Earth Resistance Test <=0.2 Ω Earth Leakage Current <=500 µA Enclosure Leakage Current <=100 µA	_____Ω _____µA _____µA		

[1] Refer to chapter 3 of TSM [2] Refer to chapter 2 of TSM [3]Refer to chapter 6 of TSM

**** Latest issue of the plunger protector jig (0000JG00014 Issue 7) has been improved so that the needle of the dial gauge rests upon the plunger head (avoid resting the needle on the moulding flash line) of the pump. This improves the linear speed accuracy test results as any variation caused by the jig movement during the test are eliminated.***

Recommended cleaning and inspection

To ensure this pump remains in good operating condition, it is important to keep it clean and carry out the routine procedures described below. All servicing should only be performed by a qualified service engineer.

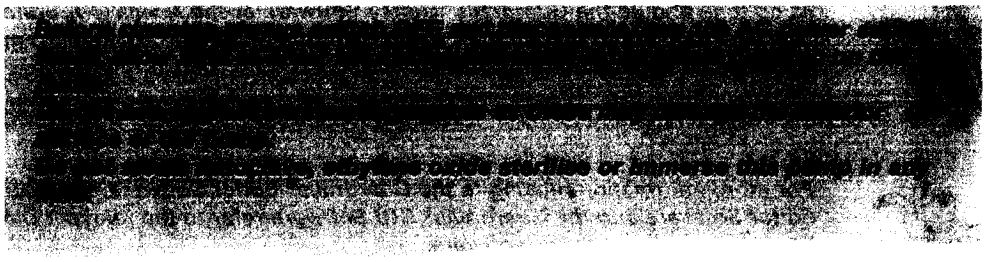
- Thoroughly clean external surfaces of the pump, by wiping over with a lint-free cloth, lightly dampened with warm water and a standard disinfectant/detergent solution.

  Do not use the following disinfectant types:

  - NaDcc (such as PRESEPT)
  - Hypochlorites (such as CHLORASOL)
  - **Aldehydes (such as CIDEX)**
  - **Cationic Surfactants (such as Benzalkonium Chloride)**
  - Iodine (such as Betadine)

Recommended cleaners are:

Brand	**Concentration**
Hibiscrub	20% (v/v)
Virkon	1% (w/v)



- Labels should be replaced as required if not flat, legible or fully adhered.
- Case components must be checked for damage and replaced if necessary.
- Check the pole clamp is not damaged and that it functions correctly.
- Inspect the AC power supply plug and cable for damage.

Use an appropriate cleaning method that does not allow an excess of fluid to accumulate around the keypads. Aggressive cleaning can potentially create a fluid ingress path into the shelf keypad which can result in keypad failure.

In case of failure, usually resulting in a KY1 error code, the shelf keypad must be replaced. As a preventive measure, shelf keypads manufactured after week number 15, 2003 should be used since they offer more protection to excessive cleaning. The week number may be found on the keypad connection tail.

We recommend that all pumps within the following serial numbers -

Asena® GS Syringe Pump	***08510 - 09976***
Asena® GH Syringe Pump	***16437 - 22286***
Asena® CC Syringe Pump	***03471 - 06632***
Asena® TIVA Syringe Pump	***01310 - 02369***

(or pumps outside of this range which had their shelf keypad replaced between 2nd July 2002 and 30th April 2003) have their shelf keypad replaced at the next routine service. All other pumps have a shelf keypad that does not exhibit this potential risk.

Data transfer (continued)

Data Set Upload and Download (401 & 499)

Upload Data Set to an Asena® Syringe Pump with Guardrails® Safety Software or an Asena® PK Syringe Pump (401)

Using the Guardrails® Editor Transfer Tool or Asena® PK Editor Transfer Tool allows a released Data Set to be uploaded to an Asena® Syringe Pump.

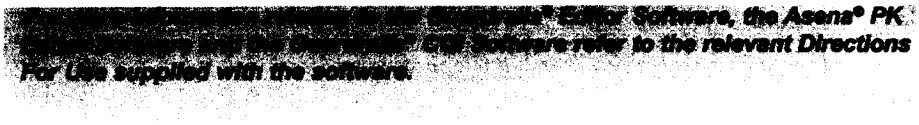
Download Data Set from an Asena® Syringe Pump with Guardrails® Safety Software or an Asena® PK Syringe Pump (499)

Using the Verification Tool allows an uploaded Data Set in an Asena® Syringe Pump to be downloaded to a PC for comparison and verification.

Download CQI Event Log (402)

Download CQI Event Log from an Asena® Syringe Pump with Guardrails® Safety Software (402)

Using the Guardrails® CQI Event Log Downloader allows the CQI Event Log to be downloaded from an Asena® Syringe Pump to a PC for use with the Guardrails® CQI Event Reporter. The Guardrails® CQI Event Reporter is a program for querying and reporting on the collective event data allowing the user to analyse trends in medication administration and track medication errors.



Information logs (376)

Use access code **376** to view the information logs (see Access Codes in chapter 2).

Log	View	Notes
Service	Displays the last 10 fault codes.	Option to view the time and date at which they occur.
Clear Service	Clears any information stored in the service log.	Will not be available if there is no data in the service log.
Event	Displays the complete event log (maximum 1500 events except Pumps with Guardrails® Software enabled which have one year of events).	Option to view the time and date at which they occur.
Key	Displays the last 200 key presses and the time they occurred.	Does not record while in Tech mode.
Use	Displays the hours of use since reset and since last cold start.	Press OK to clear hours since reset.

Access code **376** provides the following additional service options:

Service Date	Set the date when pump will display 'Service due' and any service message entered.
Service Message	Enter message to be displayed on service date.
Serial Number	Record the serial number of the pump.
Unit Reference	Free-form text field for user reference only.
Event Log	Access provided when standard power-up mode leads to errors such that the Event Log access from the Options ⓘ button cannot be accessed.
PCB Identification Number	Allows Control PCB ID to be reviewed. (Pumps with Guardrails® Safety Software only)

Data transfer *(continued)*

Teach Learn (Software versions V1.4.13 and above)

1. For the teacher pump only (not required for learn pumps), in General Options **251**, switch off RS232 before commencing Teach Learn procedure.
2. Turn the teacher pump on in normal operation.

For multiple teach-learn operations, to avoid call-back alarm every 2 minutes, turn teacher pump on in access code mode.

3. Enter the access code **167** on learn pump.
4. Align the two IrDA ports on the pumps (optimum distance is 5cm).
5. Press OK and then Yes to confirm.
6. A progress bar will travel across the learn pump.
7. When completed, select No to cancel retry.

Possible reasons for failure:

- RS232 is not switched off.
- If software versions are different, confirm teach learn procedure on learner pump to continue. Verify settings after completion of learn.
- The pump models are different. For example, an Asena® GS Syringe Pump can only teach an Asena® GS Syringe Pump.
- The line of sight between the IrDA windows was obstructed during data transfer.

After a Teach/learn procedure it is necessary to clear the previous patient setup in order to update the syringe information. On power-up after Teach/learn and when prompted with CLEAR SETUP, select YES.

Event Log download

A PC application known as the Event Log Download Utility (ELDU) (part number 1000SP00209) is available to download logs from Asena® Syringe Pumps.

ELDU operation

1. Click on ELDU icon on PC.
2. Click Accept to agree with Restrictions of Use and continue.
3. Select Configure from drop-down menu.
4. Select Setup Pump and choose Asena® as pump type.
5. Select Settings to select log to be downloaded.
6. Check communications are set as follows:
   - Required PC com port selected.
   - Set baud rate to 38400.
7. Click OK to confirm.
8. Align the IrDA converter pump with the IrDA window (optimum distance is 5cm), or connect RS232 cable.
9. Power up pump.
10. Click Download Log from main screen.
11. Press Close, when finished.
12. Select File from drop-down menu and save file. Log may be printed here as required.

Data transfer *(continued)*

Soft bootstrap

1. Load the software program onto your PC. Start the 'MP Only' version of relevant pump software. Check the correct pump type is displayed.
2. Select GO.
3. Align the IrDA converter pump with the IrDA window (optimum distance is 5cm), or connect RS232 cable.
4. Connect to serial port.
5. Enter access code **166**.
6. Press Yes to continue Bootstrap.
7. Select IrDA interface or RS232 interface.
8. Select a Baud rate of 115200.
9. The pump will then display Bootstrap in progress.
10. Press the ⊗ button to silence the alarm.
11. Select Transmit on PC. Check progress bar moves on PC and pump powers down.

Hard bootstrap

1. Load the software program onto your PC. Start the relevant pump software (not the 'MP Only' version).
2. Disconnect the battery and separate the pump.
3. Fit the Programme header onto the control board.
4. Reconnect the battery. The pump will alarm, press the ⊗ button to silence.
5. Align the IrDA converter pump with the IrDA window (optimum distance is 5cm), or connect RS232 cable.
6. Connect to serial port.
7. Switch the Programme header to the correct position either RS232 or IrDA.
8. Switch on the Programme header.
9. Select GO on the PC software program.
10. Select Transmit on PC. Check progress bar moves on PC and pump powers down.

Cold start

It may be necessary to carry out a cold start if the pump has changed between certain software. Refer to documentation supplied with the software disk to see if cold start is required.

1. Enter access code **611**, then power down when prompted.
2. Perform a full calibration.

Caution - Potential Erasure of Data:
Cold Start erases ALL information from the pump. This feature should only be used when changing between incompatible software versions. Full recalibration and reconfiguration will be required. ALARIS Medical Systems technicians should not re-instate drug information (this MUST be left to the customer).

Power Failure
Failures may occur when using laptops when communicating with Asena® Syringe Pumps, due to power requirements.
External power supply may be used in conjunction with IrDA or RS232 cable to compensate for lack of power from laptop.

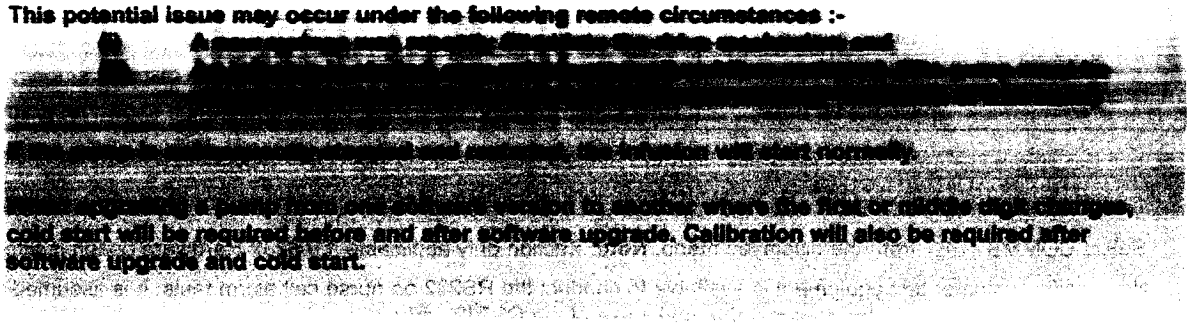
Please Note IrDA data transfer can be affected by bright sunlight or fluorescent lighting.

Data transfer

Upgrading software

Upgrade of the Asena® Syringe Pump (except the Asena® TIVA Syringe Pump) software to V1.5.10 or greater is recommended at the next service, for Asena® Syringe Pumps with software versions V1.5.9 and below. Perform upgrades by acquiring the software upgrade kits specified in spare parts listings. This will address a potential issue that may result in a condition where the running LED is flashing, the infusion status shows "INFUSING" but the volume infused display will not increment and no drug will be infused into the patient.

This potential issue may occur under the following remote circumstances :-



Tools required

- The Software Distribution Disk (See table below)
- Programming kit 1000SP00172 (Includes Programme Header and IrDA cable)
- IrDA port on PC or Comms Port
- RS232 cable 1000SP00336

IrDA power-down test

To check PC is set up correctly for communication with Asena® Syringe Pumps the Power Down Test needs to be performed on one Asena® Syringe Pump only as follows:

1. Load the IrDA Power Down Test program on your PC.
2. Select GO on the PC software program.
3. Align the IrDA converter with the pump IrDA window (optimum distance is 5cm).
4. Connect to serial port.
5. Enter access code **166**.
6. Press Yes to continue Bootstrap.
7. Select IrDA interface.
8. Select a Baud rate of 115200.
9. The pump will then display Bootstrap in progress.
10. Press the ⊗ button to silence the alarm.
11. Select Transmit on PC. Check progress bar moves on PC and pump powers down.

Software Versions available

Syringe Pump Model	Software		Enhanced Software		Guardrails® Safety Software
	Mk1/Mk2	Mk3	Mk1/Mk2	Mk3	Mk3
Asena® GS Syringe Pump	1000SP00243 (MP v1.5.10)	1000SP00498 (MP v2.0.0)	1000SP00565 (MP v1.8.1)	1000SP00572 (MP v2.2.1)	
Asena® GH Syringe Pump	1000SP00244 (MP v1.5.10)	1000SP00499 (MP v2.0.0)	1000SP00566 (MP v1.8.1)	1000SP00573 (MP v2.2.1)	MP v3.1.3 (Installed by ALARIS Personnel)
Asena® CC Syringe Pump	1000SP00229 (MP v1.5.10)	1000SP00500 (MP v2.0.0)	1000SP00567 (MP v1.8.1)	1000SP00574 (MP v2.2.1)	MP v3.1.2 (Installed by ALARIS Personnel)
Asena® TIVA Syringe Pump	1000SP00453 (MP v1.6.2)	1000SP00501 (MP v2.1.0)	1000SP00568 (MP v1.8.1)	1000SP00575 (MP v2.2.1)	
Asena® EP Syringe Pump					MP v3.1.2 (Installed by ALARIS Personnel)
Asena® PK Syringe Pump				1000SP00614 (MP v3.2.5)	

Key: MP = Main Processor. Mk1/Mk2/Mk3 are the released versions of the Control PCB.

Self-test procedure (123) *(continued)*

Self-tests not included in full test

Test Section	Test	Action
Remote	Remote	Check the function of the IrDA output for remote access
Calibration records	Syringe clamp	Displays calibration values for Closed and Open positions.
	Plunger position	Displays calibration values for Left, Middle and Right positions.
	Syringe force	Displays calibration values for 0, 3 and 10 kgf.
	Line pressure	Displays calibration values for 25, 500 and 1000mmHg (Models CC & EP only)
Linearity	**Linearity**	**Check the mechanism runs full travel and graph displays smooth linear travel.**
	Occlusion base	**Check the occlusion base level is within tolerance shown on graph.**

Comms test (123)

Select COMMS TEST from the displayed menu. **Note:** Section only applicable if RS232 Hardware option is fitted.

No specific customer test equipment is available to conduct the RS232 on nurse call alarm tests. It is assumed that the customer will have associated systems that make use of the RS232 and nurse call options, hence:

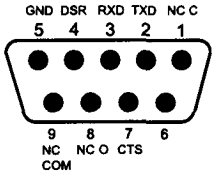
The nurse call system can be tested, once connected to the customer facility, by running the pump and simulating an alarm condition (e.g. Disengaging the drive while running).

The RS232 system can be tested by communicating with the pump using a customer application.

If no customer systems are available for in-use testing, the following connections to the 9 pin D type output socket will permit testing. It is recommended that all test connections are made via a 9 way D type plug that can be fitted into the pump socket.

Test	Description
RS232 Test	Only available when Nurse Call option is fitted. **Note:** NURSE CALL FITTED & RS232 SELECTED must be enabled (✓) in access code **251** General Options for this test to work. Connect the 9-pin D type connector to the 9 pin D type output socket at the rear of the pump. The display '_ _ _ _' will change to PASS if the communications test is successful.
Nurse Call	Only available when Nurse Call option is fitted. **Note:** NURSE CALL FITTED & RS232 SELECTED must be enabled (✓) in access code **251** General Options for this test to work. Locate the 9-pin D type connector at the rear of the pump. Check that the Nurse Call relay switches from NC to NO connections during test.

RS232 pinout



Pin Number (Pump Socket Id)	Required Action	Comments
1	Nurse call relay - normally closed connection	With nurse call test in progress - Confirm continuity with pin 5 - Alternately switches with pin 8.
2	Link pin 2 to pin 3	RS232 Tx and RX test link. With RS232 test in progress - Confirm 'PASS' is displayed on test screen.
3	See pin 2	——
4	Not used	——
5	0 volt line	With respect to pin 7.
6	Not used	——
7	Apply 9 to12 volts DC	RS232 Power supply - with respect to pin 9.
8	Nurse call relay - normally open connection	With nurse call test in progress - Check continuity to pin 5 - Alternately switches with pin 1.
9	Nurse call relay - common connection	——

Software fault codes *(continued)*

Code	Module	Failure	Action/Replace
KL1	Key Log	Open key log file at power up	Control PCB
KL2		File storage software module	
KL3		Log read index	
KL4		Log write index	
KL5		Log data read	
KL6		Log data write	
KL7		Log data seek	
KL8		Log repair failure	
KL9		Log format failure	
KL10		Log reporting failure	
KL11		Log extracting failure	
KL12		Log pack failure	
KL13		Log unpack failure	
KY1	Keypad	Keypad key stuck down for 10mins	Keypad or Control PCB
KY2		Line failure	
LC2	LCD	LCD control parameter storage	Control PCB or Display PCB
LC3		LCD display memory test	
ME1	Motor Encoder	Motor encoder module software	Motor encoder or Control PCB
ME2		Overrun detected	
ME3		Motor encoder interrupt service software run when encoder is disabled	
MT1	Stepper Motor	Motor module software	Check motor wire connections, opto flag not slipping and encoder gear is not in line with opto. Chassis PCB, Control PCB.
MT2		Encoder has failed, preventing motor software continuing to run	
MT3		Safety processor has failed, preventing motor software continuing to run	
MT4		Motor rotation in wrong direction	
MT5		Motor rotation speed has drifted	
MT6		Running at wrong rate	
MT7		Motor rotation detected when it should be stopped	
MT8		Motor not rotating when it should be	
MT9		Motor rotation inhibit control of Safety Processor	
MT10		Motor rotation travel data has reached maximum value	
MT11			
MT12		Motor critical data	
NC1	Nurse Call	ADC preventing nurse call operation	Control PCB or RS232/Nurse Call PCB
NC2		Monitor signal is out of range	
NC3		Relay current monitor drive	
NC4		Safety processor failure	
PA1	Patient Data	Patient Data retrieval failure	Control PCB
PA2		Patient Data storage failure	
PA3		Patient Data data error	
PA4		Patient Data IDFS error	
PB1	Plunger Button	Plunger button module software	Plunger drive flexi, Control PCB or Transmission PCB flexi
PB2		Plunger button opto self test	
PB3		Emitter in wrong state	

Software fault codes *(continued)*

Code	Module	Failure	Action/Replace
PC1	PIP Controller	PIP Controller software module	Control PCB
PC2		PIP Controller critical data	
PC3		Phase module critical data	
PC4		Fluid delivery software module	
PC5		PIP Controller setup data retrieval	
PC6		PIP Controller setup data storage	
PD1	Pressure Disc	Pressure disc module software	Pressure disc opto or Control PCB
PD2		Pressure disc opto self test	
PD3		Emitter in wrong state	
PF1	Plunger Fitment	Plunger fitment software module	Optos,Cables, Control PCB or Plunger assy.
PF2		Gripper opto module software	
PF3		Plunger button opto module software	
PFM1	Profile Manager	Profile storage failure	Control PCB
PFM2		Profile retrieval failure	
PFM3		Profile startup failure	
PFM4		Profile data corruption	
PG1	Plunger Grippers	Plunger gripper module software	Plunger gripper opto, Transmission PCB, or Control PCB
PG2		Plunger gripper opto self test	
PG3		Emitter in wrong state	
PL1	Plunger Drive	Plunger drive software module	Control PCB or Chassis PCB
PL2		Alarm manager software module	
PL3		Plunger drive travel deviation	Calibrate linear travel. Plunger position linear potentiometer. Control PCB or Chassis PCB
PL4		Plunger position monitor software	Control PCB or Chassis PCB
PL5		Motor software module	
PL6		Syringe software module	
PL7		User configuration option software	
PM1	Pressure Measurement	Pressure measurement software	Control PCB
PM2		Pressure sensor	
PM3		Syringe force	
PM4		User configuration options	
PM5		Syringe	
PM6		Setup retrieval failure	
PM7		Setup storage failure	
PP1	Plunger Position Monitor	Plunger position monitor software	Control PCB
PP2		ADC	
PP3		Plunger position sensor	Plunger position linear potentiometer.
PP4		Plunger position sensor calibration	Calibrate linear travel
PP5		Plunger position cal data retrieval	Control PCB
PP6		Plunger position cal data storage	
PP7		Drive engagement software	

Software fault codes *(continued)*

Code	Module	Failure	Action/Replace
PS1	Pressure Sensor	Pressure sensor software module	Control PCB
PS2		ADC	
PS3		Current reading invalid	Pressure sensor or Control PCB
PS4		Voltage (Normal) reading invalid	
PS5		Voltage (Test) reading invalid	
PS6		**Pressure sensor calibration**	**Calibrate pressure sensor**
PS7		**Pressure sensor cal data retrieval**	**Control PCB**
PS8		Pressure sensor cal data storage	
PS9		Pressure sensor amplifier gain	Pressure sensor or Control PCB
PS10		Pressure sensor shift failure	
SC1	Syringe Clamp	Syringe clamp software module	Control PCB or syringe clamp potentiometer
SC2		ADC	
SC3		Syringe clamp sensor readings	
SC4		Syringe clamp calibration	Calibrate syringe clamp
SC5		Syringe clamp cal data retrieval	Control PCB
SC6		Syringe clamp cal data storage	
SD1	SD Data	Service data file retrieval	Perform Cold start. Control PCB
SD2		Service data file storage	
SD3		Service data file contents	
SF1	Syringe Force	Syringe force sensor software	Control PCB
SF2		ADC	
SF3		Syringe force sensor current reading	Motor plate or Control PCB
SF4		Syringe force sensor normal reading	
SF5		Voltage (test) reading	
SF6		Syringe force sensor calibration	Calibrate syringe force
SF7		Syringe force cal data retrieval	Control PCB
SF8		Syringe force cal data storage	
SF9		Syringe force sensor amplifier	Motor plate or Control PCB
SF10		Syringe force output	Calibrate syringe force. Motor plate.
SP1	Safety Processor	Safety processor program memory	Control PCB
SP2		Safety processor ID version	
SP3		Safety processor	
SV1	Service Log	Service Log software module	Control PCB
SV2		File storage software module	
SV3		Log read index	
SV4		Log write index	
SV5		Log data read	
SV6		Log data write	
SV7		Log data seek	
SV8		Log repair failure	
SV9		Log format failure	
SV10		Log reporting failure	
SV11		Log extracting failure	
SV12		Log pack failure	
SV13		Log unpack failure	

Software fault codes *(continued)*

Code	Module	Failure	Action/Replace
SY1	Syringe Manager	Syringe manager software module	Control PCB
SY2		Syringe clamp	
SY4		Plunger fitment	
SY5		Plunger button stuck in	Check plunger button. Control PCB.
SY6		Syringe data table retrieval	Control PCB
SY7		Syringe data table storage	
TC0	PK / TCI	No fault found	Contact your local ALARIS Service representative
TC1		TCI data corruption	
TC2		TCI not configured	
TC3		TCI incorrect state	
TC4		PK Model error	
TC5		PK Model parameters error	
TC6		PK Model init error	
UC1	User Config. options	User config. option file retrieval	Control PCB
UC2		User config. option file storage	
UC3		User config. option data retrieval	
UC4		User configuration model	Perform Cold start
UT1	User Timer	User timer master clock	Control PCB
UT2		User timer software request	

Exception error handling

Exception errors include Assertion Errors and Enum Failure Errors and are used to trap logical errors in the software execution.

The pump will display the error type, the title of the software module in which the error occurred and the line number. The user should make a note of these for use in diagnosis. This information is stored in the service log (access code **376**).

After an error, the pump will not store information when powered down. When the pump is switched on again, the user should always confirm clear setup (this is done automatically with software version V1.5.9 and later).

General fault diagnosis

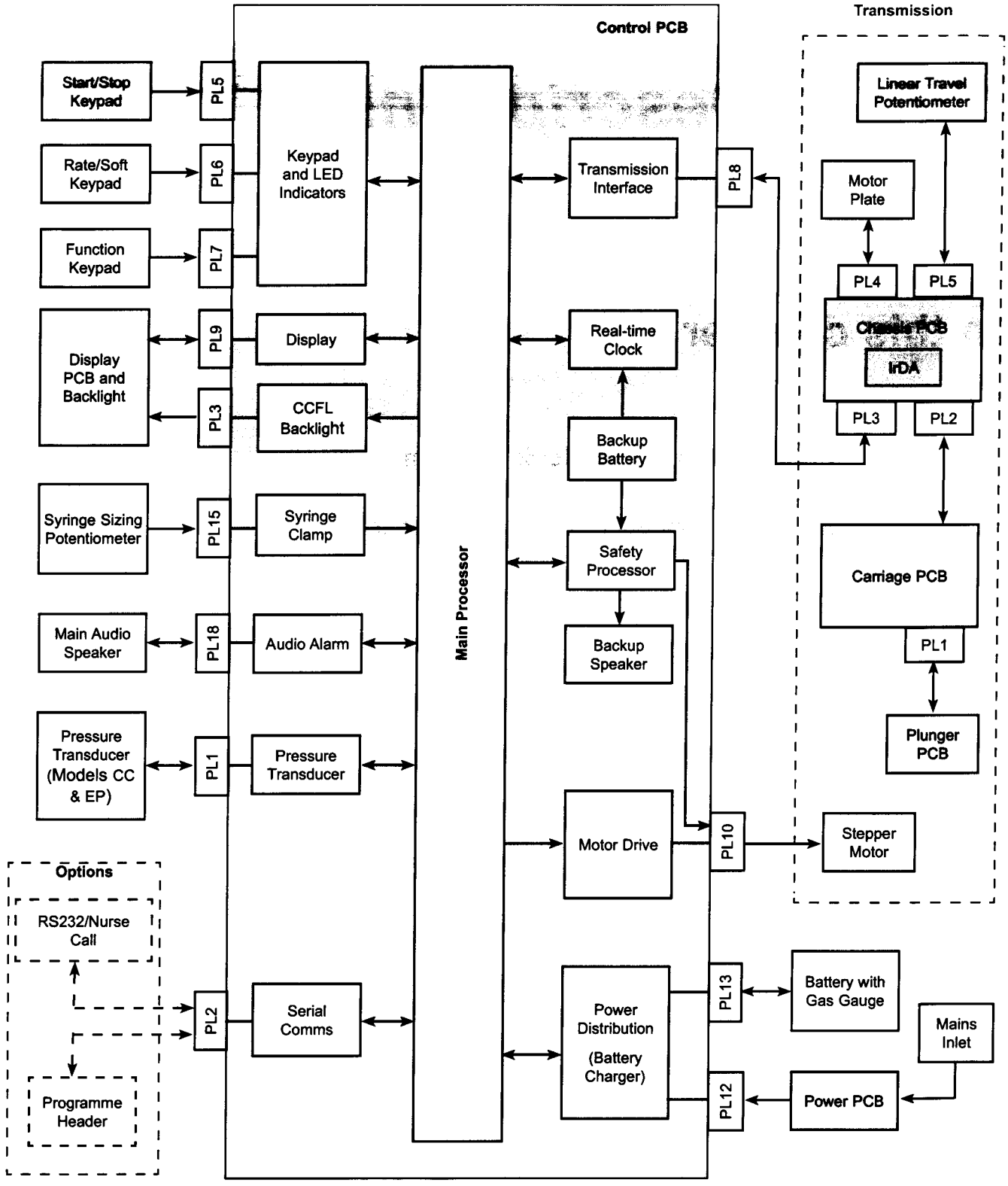
		Parts to Check/Test									
		Front Case	Rear Case	Labels & Keypads	Mechanism	Control PCB	Power PCB	Display PCB	Battery	Mains Lead	Fuses
General Fault	Dropped or damaged	✓	✓		✓	✓	✓	✓			
	Exposed to fluids	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	No battery power			✓		✓			✓		
	No AC mains power			✓		✓	✓			✓	✓
	Delivery rates out of tolerance	✓			✓	✓					

Chapter 5

Circuit Descriptions

In this chapter

Functional module block diagram



Module overview functional description

The Asena® Syringe Pumps are designed to be serviced generally to major assembly level. The PCBs are designed as non-serviceable items and as such, can only be replaced as complete parts.

The major assemblies are:

- Control PCB
- Power Supply Unit PCB
- Display PCB
- Battery
- Transmission
- Transducer (Models CC & EP)

ALARIS Medical Systems will make available, on request, circuit diagrams which will assist appropriately qualified technical personnel to repair those parts of the device which are designated by the manufacturer as repairable.

Control PCB

Contains the main processor module, which provides the control functions for almost all aspects of the pump. It drives and monitors all other modules using the program code stored in the flash eprom. The main processor runs the main application program. The main processor directly interfaces to:

- Safety Processor
- Keypads
- Display
- Real Time Clock
- Communications Switch to IrDA and RS232 (optional) interfaces
- Nurse Call Output
- Indicator LEDs
- Audible Alarm
- Motor – controller and dual channel coil driver DAC
- System Sensors (including: syringe clamp, plunger position, drive engagement opto, plunger button opto, syringe force sensor, line pressure sensor, pressure disc opto, motor encoder, AC power).
- Backlight
- Power supply
- Battery gas gauge

The function of the Safety Processor Module is to ensure the correct operation of the Main Processor by constantly exchanging data. If an error is detected, the module can independently disable the stepper motor that drives the transmission. Additionally, it can create both audible and visible alarms using its dedicated piezoelectric buzzer, alarm LED and, if fitted, the Nurse Call Interface.

The Safety Processor controls (independent of main processor):

- Audio sounder
- Visual indicator LED
- Control signal to inhibit motor drive
- Power supply hold up control

Pressure Transducer (Models CC & EP)

Monitors the line pressure when the pressure disc is inserted and flags the presence of a pressure disc. The Control PCB checks the transducer for presence of a pressure disc and the line pressure when a disc is present.

Power Supply Unit PCB

The Power Supply Unit (PSU) is a single output switched-mode power supply rated at 15 VDC/1.6 A continuous duty. The PSU has a wide input voltage range of 85 to 264VAC, 47-63 Hz single phase.

Display PCB

The Pump uses a Cold Cathode Fluorescent Lamp (CCFL) as a backlight for the negative mode LCD display. The CCFL Backlight Supply Module generates the high voltages required to drive the lamp and facilitates software based brightness control.

Battery

The Battery Pack Module provides system power in the absence of a mains supply.

The Battery Pack Module consists of six 1.2V 2.7Ah NiMH battery cells connected in series, a thermal fuse, thermal circuit breaker and Gas Gauge Module sealed in a heat shrink sleeving.

The Gas Gauge Module is permanently connected across the battery terminals so that it can monitor terminal voltage, charge / discharge current and the battery pack temperature.

Through charge monitoring information, from the Gas Gauge Module, the Control PCB Main Processor Module determines the battery charge level and hence 'Battery Low' and 'Battery Empty' conditions.

Battery capacity will reduce over time.

Annual battery calibration is recommended to update Gas Gauge Module with 'up to date' battery capacity information.

If the battery pack fails to achieve the calibration limits, it is recommended that the battery pack is replaced and calibration performed.

Transmission

The Transmission Interface Module provides the Pump with the capability of monitoring a number of critical parameters associated with the transmission operation. The device can detect failures or incorrect operation of the transmission and prevent incorrect drug dosage administration.

The electronics for this module occupy three separate PCBs that are located in various areas of the transmission as follows:

Plunger PCB – Located inside the Plunger Holder Assembly. Contains the electronics that detect correct syringe plunger location and gripper motion.

Carriage PCB – Located on the Transmission Carriage. Contains electronics that detect correct engagement of the Half Nut with the Leadscrew.

Chassis PCB – Located on the Chassis Extrusion. This facilitates measurement of motor speed, syringe drive force and linear plunger position. Additionally, the IrDA compliant infrared transceiver is positioned on the reverse side of this PCB. The stepper motor which drives the mechanical transmission of the pump is controlled by the Motor Drive module on the Control PCB.

Chapter 6

Component Interchange

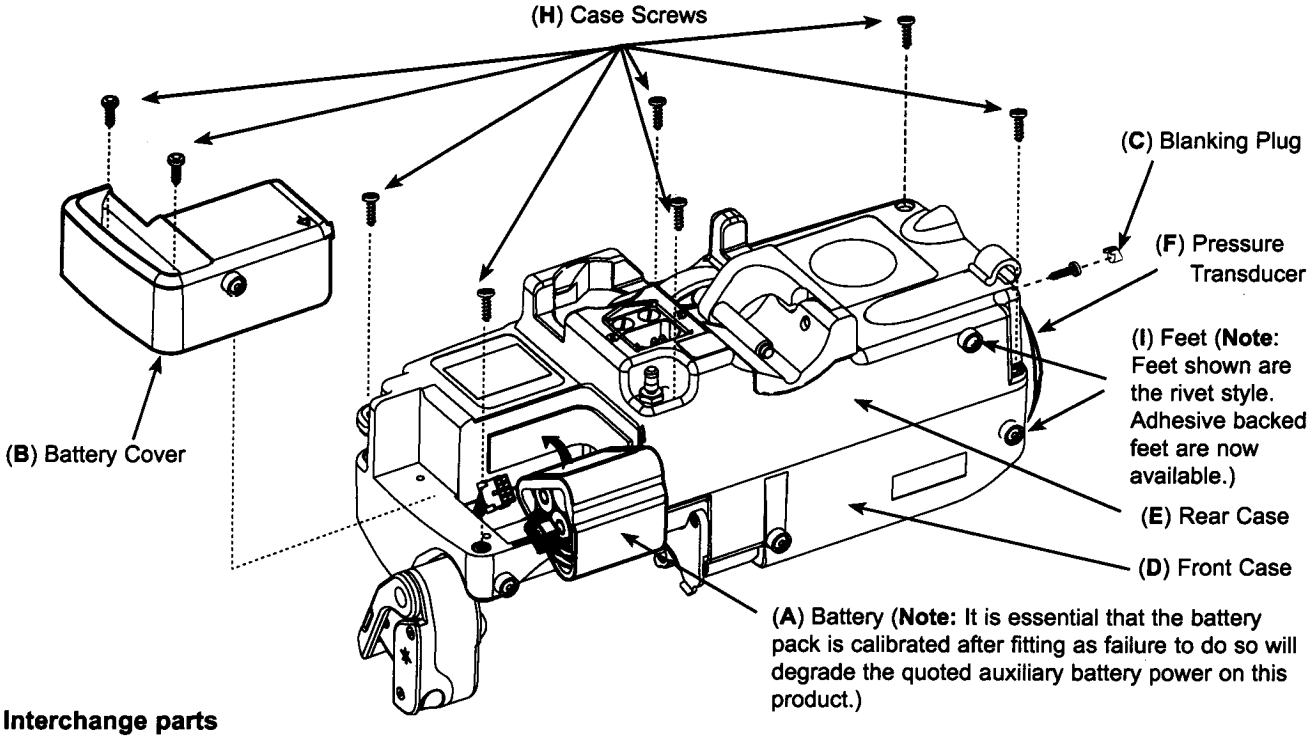
In this chapter

[redacted]
Always protect the plunger holder and syringe clamp when the pump is upside down. For regular servicing, the use of the case support cradle Part No. 9000JG00047 is recommended.
Batteries should be disposed of as outlined by the local country regulations. Do not send batteries back to the manufacturer.
For fastener torque settings, please refer to Appendix C Fitting & Replacement guidelines.
Only use ALARIS Medical Systems recommended spare parts.

Access to pump

Interchange

1. Remove the two case screws in battery cover, remove cover and battery.
2. Remove the six case screws.
3. Model CC only: Insert a flat-blade screwdriver into the blanking plug of transducer, prise plug away from transducer and remove securing screw.
4. Carefully separate case halves and disconnect cables.
5. Where necessary, remove the foot rivets with a flat-blade screwdriver and remove the feet from the case. Refer to additional information on the following page concerning rivet orientation.
6. Reassemble in reverse order.



Interchange parts

Item	Description	Part Number
A	ASENA SP, Assy, Battery	1000SP01122
B	ASENA SP, Battery Cover/Handle	1000SP01121
C	ASENA CC, Assy, Plug Blanking Transducer	1000ME01317
D	ASENA GS, Kit, Front Case	1000SP00478
D	ASENA GH, Kit, Front Case	1000SP00479
D	ASENA TIVA, Kit, Front Case	1000SP00480
D	ASENA CC, Kit, Front Case	1000SP01153
D	ASENA PK, Kit, Front Case	1000SP00658
D	ASENA EP, Kit, Front Case	1000SP00641
E	ASENA GS/GH/TIVA, Kit, Rear Case	1000SP01115
E	ASENA CC, Kit, Rear case	1000SP01154
F	ASENA CC, Kit, Pressure Transducer	1000SP01155
G	ASENA SP, Case Sealing Cord (1m) (internal, not shown)	1000ME00311
H	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466
I	ASENA SP, Kit, Spare adhesive foot rivet replacement	1000SP00593
I	ASENA SP, Kit, Spare adhesive foot	1000SP00595

Access to pump *(continued)*

The Pump has two types of rivet feet, one type is white and the other is black. The rivet feet can be removed and replaced without opening the pump, and may be replaced with adhesive backed feet as described below.

There are also two types of cases, one that had rivet feet and therefore holes in the cases for them and the other is without the holes but only a recess for the adhesive backed foot to fit into.

For cases that had rivet feet and therefore holes, kit 1000SP00593 is required. For cases without the holes, kit 1000SP00595 is required.

Kit 1000SP00593 contains a fitting instruction, 242 adhesive backed feet, 242 foot bonding pads and one 20g tube of Loctite 454 gel adhesive. This kit is intended as a replacement for the rivet style foot and has enough feet for 48 pumps.

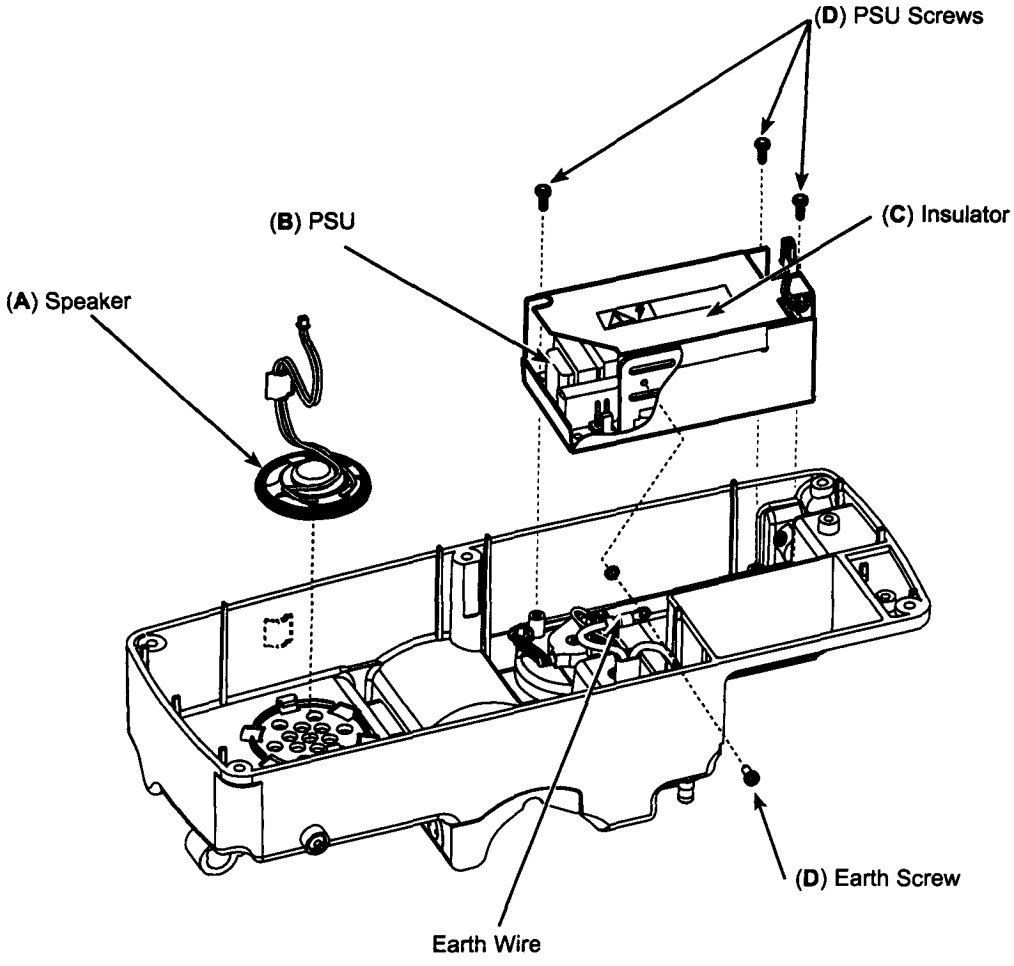
Kit 1000SP00595 contains 11 adhesive backed feet only. This kit is intended for cases that do not have the rivet feet and therefore no holes in the cases. Only a recess is present for the adhesive backed foot to be placed into.

Rear case and subassemblies

Power Supply Unit & Speaker

Interchange

1. Disconnect the PSU cable.
2. Remove the three PSU screws.
3. Remove earth wire screw and washer.
4. **Remove PSU and insulator.**
5. **With a pair of soft-faced pliers, carefully compress the catch holding the internal speaker and pull the speaker up and out.**
6. Reassemble in reverse order.



Interchange parts

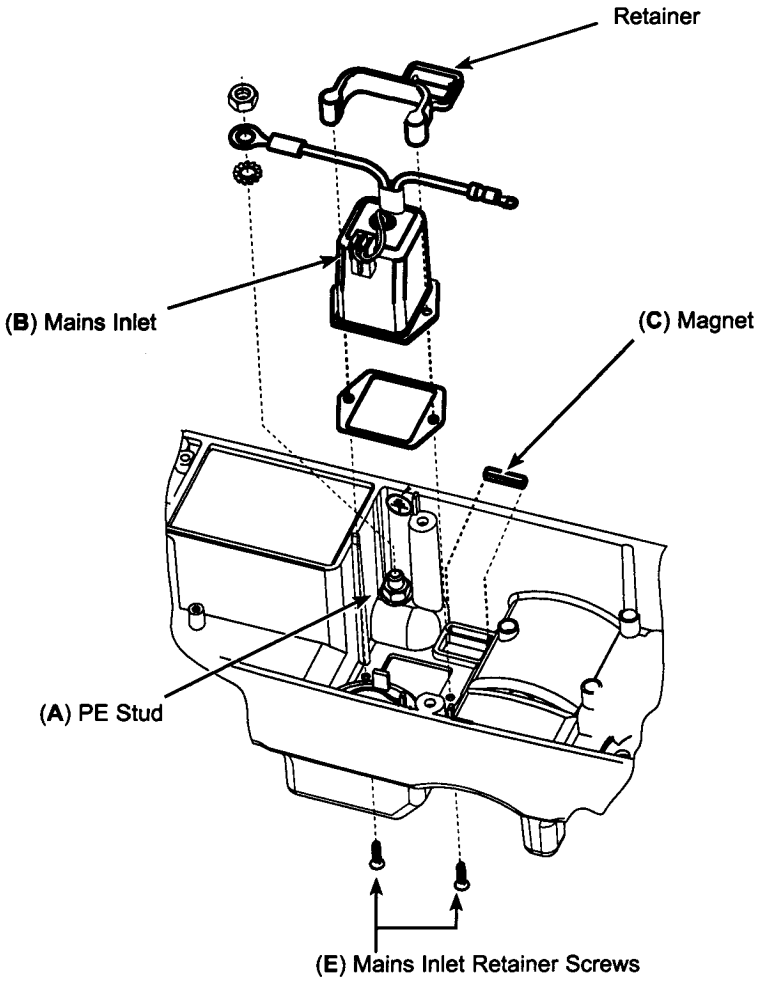
Item	Description	Part Number
A	ASENA SP, Kit, Speaker	1000SP01130
B	ASENA SP, Assy, Power Supply Unit (PSU)	8000EL00063
C	ASENA SP, Assy, PSU Insulator	1000ME01306
D	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466

Rear case and subassemblies *(continued)*

Rear case – mains inlet, PE stud and magnet

Interchange

1. Remove two nuts to remove PE stud.
2. Remove the two screws on Mains inlet.
3. Remove mains inlet and retainer.
4. **Remove magnet by lifting one end.**
5. **Reassemble in reverse order.**



Interchange parts

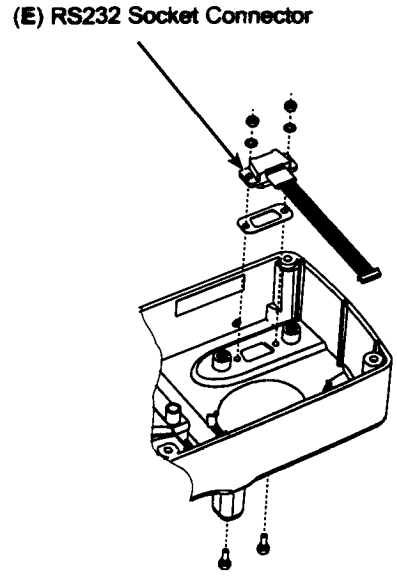
Item	Description	Part Number
A	ASENA SP/GW, Kit, PE Stud	1000SP00467
B	ASENA SP, Kit, Mains Inlet	1000SP01124
C	Magnet IR Detect	1000ME01303
D	ASENA SP, Fuse, T-1.25A Slow Blow, Mains (not shown)	1000EL00222
E	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466

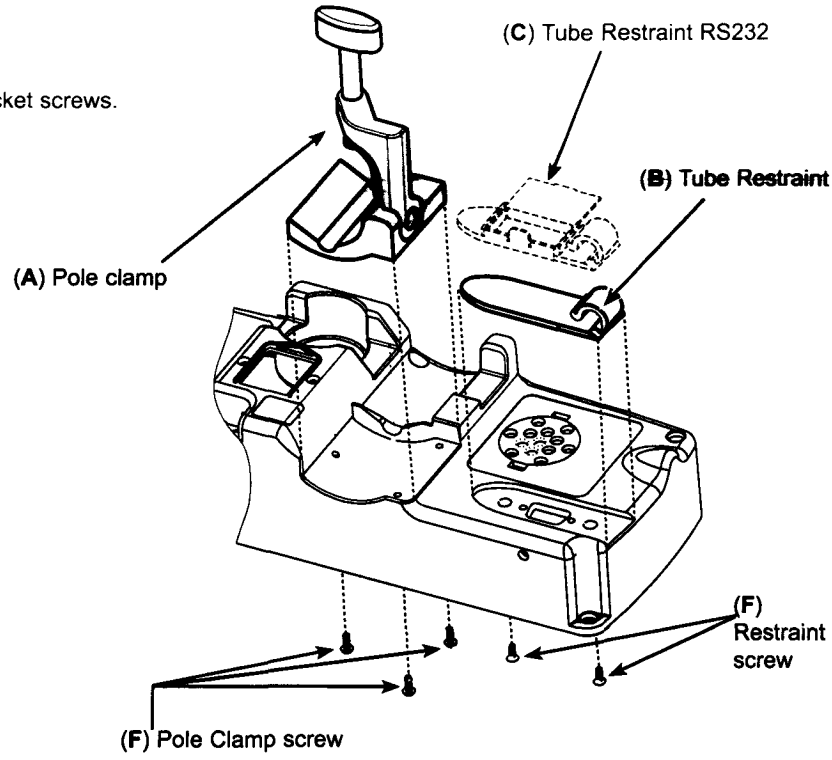
Rear case and subassemblies *(continued)*

Pole clamp and RS232

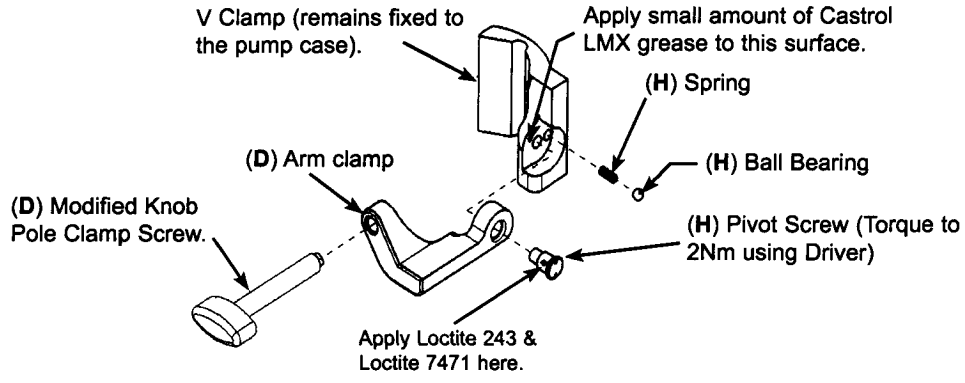
Interchange

1. Remove three pole clamp screws.
2. Remove two tube restraint screws.
3. Remove two nuts & washers from RS232 socket screws.
4. **Reassemble in reverse order.**





The Pole Clamp Arm material has been changed to a stronger material to prevent the arm from bending when tightened.
The Pole Clamp Arm spares kit replaces parts of the Pole Clamp assembly to address bent or slipping Pole Clamps. Note: There is no requirement to remove the V Clamp.



Interchange parts

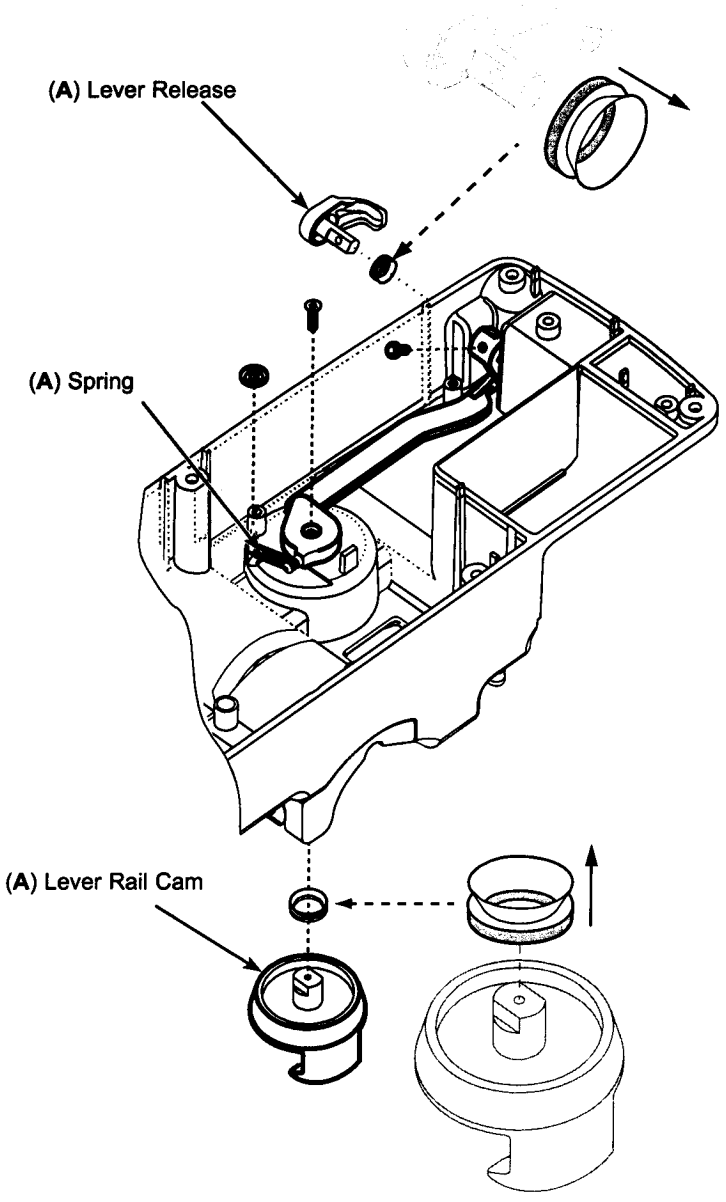
Item	Description	Part Number
A	ASENA SP, Assy, Pole clamp	1000SP00115
B	ASENA SP, Tube restraint blank	1000ME01213
C	ASENA SP, Tube restraint RS232	1000ME01214
D	SPARE KIT POLE CLAMP ARM	1000SP00589
E	ASENA SP/GW, Kit, RS232 connector	1000SP00468
F	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466
G	POLE CLAMP SNAKE EYE DRIVER (NOT SHOWN)	1000ME01466
H	SPARE POLE CLAMP ARM KIT ASENA SP/GW	1000SP00483

Rear case and subassemblies *(continued)*

Rail cam

Interchange

1. Remove screw from lever release.
2. Remove screw from lever rail cam.
3. Remove locking washer from spring.
4. Reassemble in reverse order.



Interchange parts

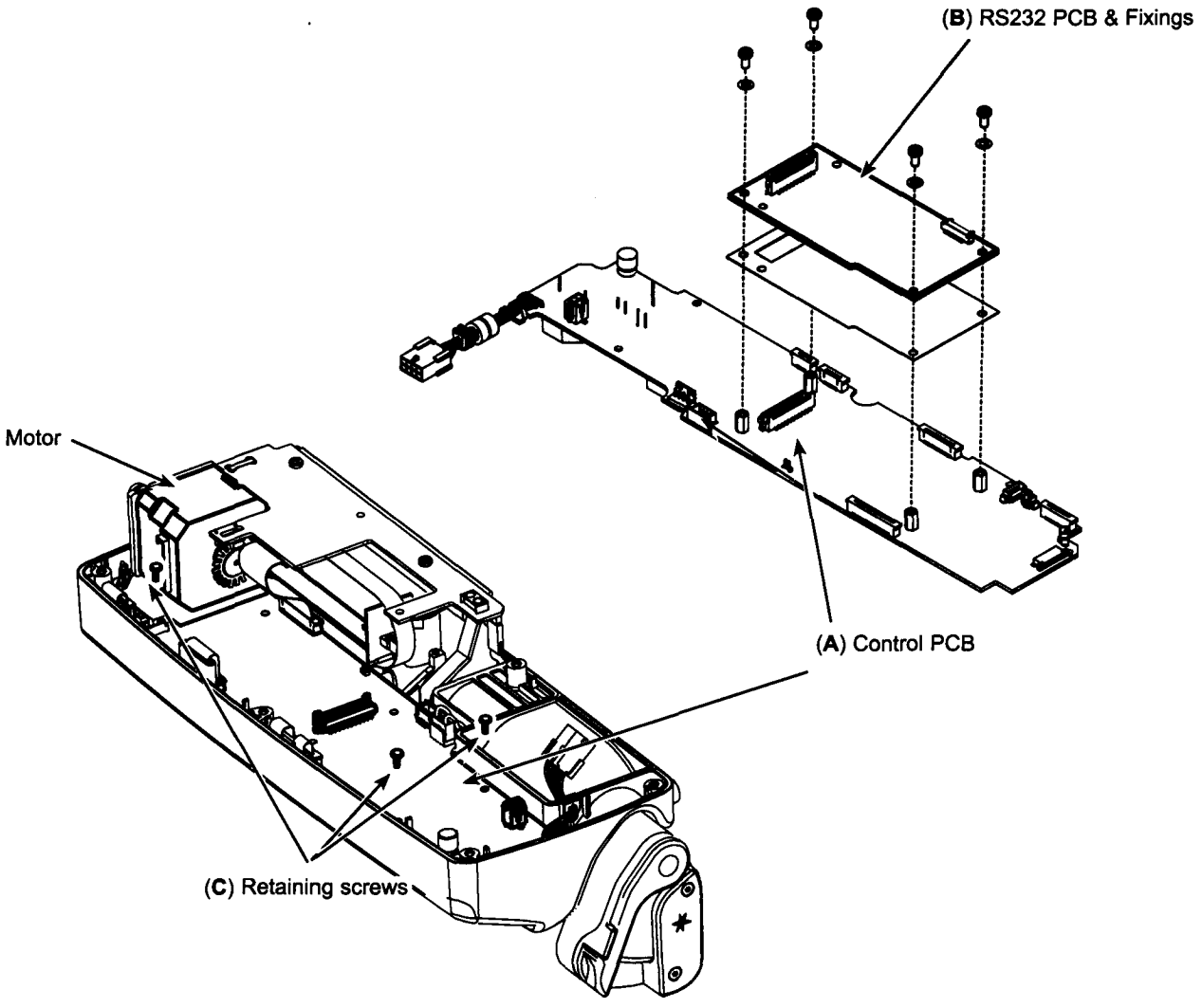
Item	Description	Part Number
A	ASENA SP, Kit, Rail Cam	1000SP01114

Front case and subassemblies

Front case – Control PCB and RS232 (if option fitted)

Interchange

1. Disconnect cable from RS232 PCB.
2. Remove the four retaining screws and washers from RS232 PCB.
3. Remove the three retaining screws and disconnect all flexi and cable connections. Push the motor towards the transmission to ease removal of Control PCB.
4. **When fitting Control PCB ensure all flexi and cables are routed clear of PCB.**
5. **Connect all flexi and cable connections - secure with the three retaining screws.**
6. Reassemble RS232 PCB in reverse order.



Interchange parts

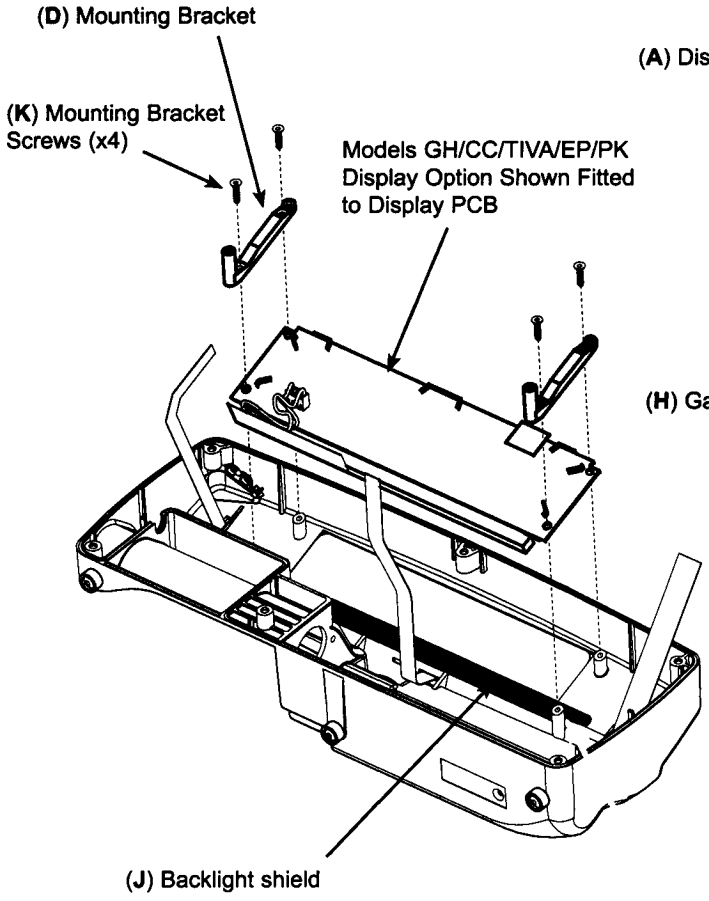
Item	Description	Part Number
A	ASENA GS, Control PCB (Software V2.2.1)	1000SP00494
A	ASENA GH, Control PCB (Software V2.2.1)	1000SP00495
A	ASENA CC, Control PCB (Software V2.2.1)	1000SP00496
A	ASENA TIVA, Control PCB (Software V2.2.1)	1000SP00497
A	ASENA PK, Control PCB (Software V3.2.5)	1000SP00637
B	ASENA SP, Kit, RS232 (PCB & Fixings)	1000SP01160
C	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466

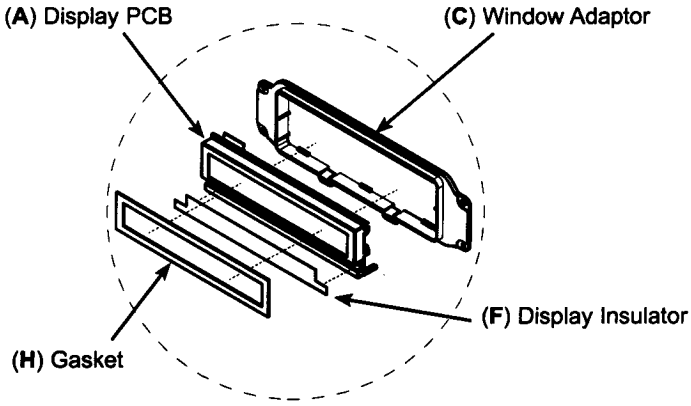
Front case and subassemblies *(continued)*

Display PCB

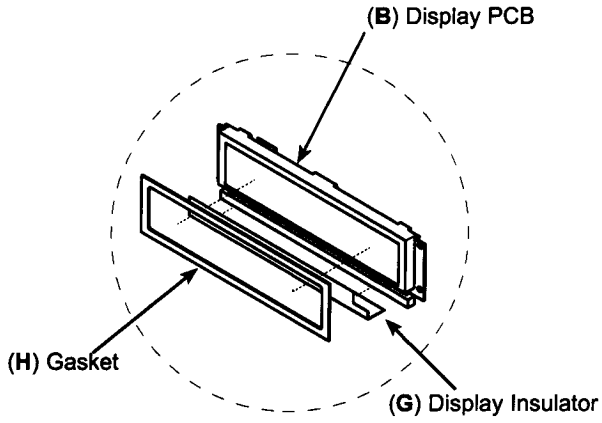
Interchange

1. Remove the flexible circuit ferrite.
2. Remove the four display fixing screws and two display mounting brackets.
3. Reassemble in reverse order. For the Model GS fit the adaptor bracket to the display.
4. **Secure the shelf keypad flexi to the display using double-sided adhesive pad.**





Model **GS Display Option**



Models **GH/CC/TIVA/EP/PK Display Option**

Interchange parts

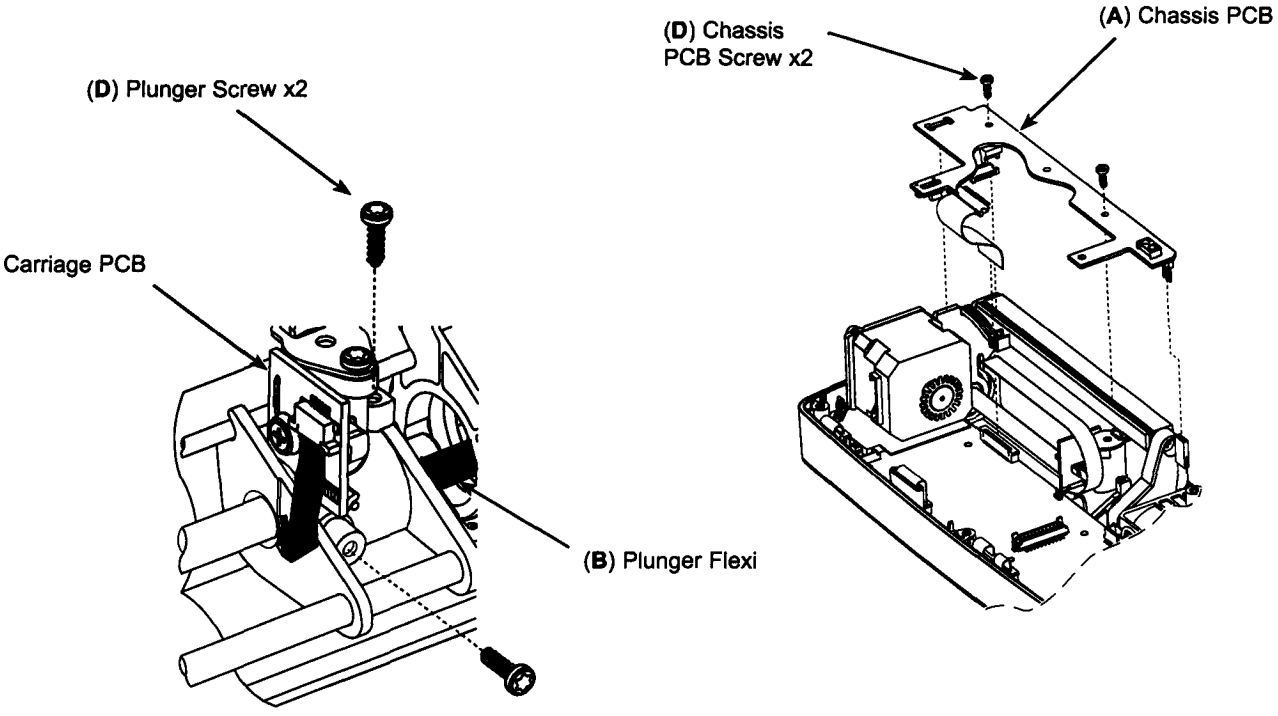
Item	Description	Part Number
A	ASENA GS, Display PCB	1000SP01118
B	ASENA GH/CC/TIVA, Display PCB	1000SP01119
C	ASENA GS, Assy, Window Adaptor Display	1000SP00122
D	ASENA SP, Assy, Bracket Display Mounting	1000ME00261
E	Pad Self-adhesive Double-sided 12x12mm	0000ME00423 (not shown on back of Display PCB)
F	ASENA GS, Assy, Display Insulator	1000SP00187
G	ASENA GH/CC/TIVA, Assy, Display Insulator	1000SP00188
H	ASENA SP, Assy, Gasket Display	1000ME01301
I	ASENA GH/CC/TIVA, Kit, Display Protection	1000SP01137 (not shown on back of Display PCB)
J	ASENA GS, Kit, Backlight Shield	1000SP00273
K	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466

Front case and subassemblies *(continued)*

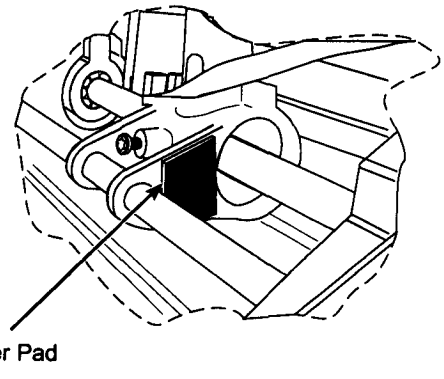
Front case – Chassis PCB and Plunger assembly

Interchange

1. Remove the two Chassis PCB screws. Disconnect all cables.
2. Extend the plunger out to its full extent and fully loosen the two plunger retaining screws in the carriage.
3. Carefully remove the plunger flexi from the carriage PCB and straighten. While applying controlled force to the plunger, extract it from the carriage and withdraw it completely.
4. Reassemble in reverse order.



Check Buffer Pad fitted if serial numbers are within either of the ranges 0001-03468 & below or 0002-06768 & below. If not fitted, clean the surface of the carriage face nearest the plunger drive tube and fit Buffer Pad in the position shown (sloping edge to match carriage profile, see diagram).



Interchange parts

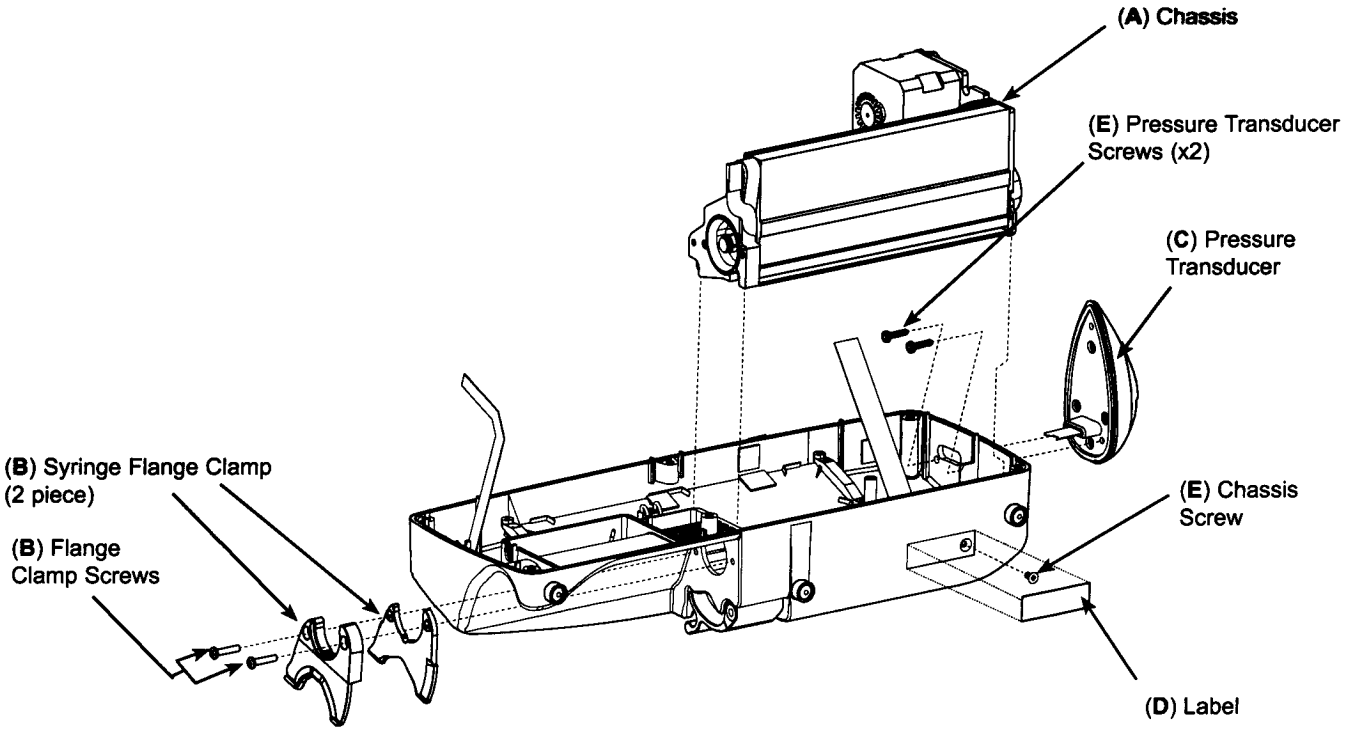
Item	Description	Part Number
A	ASENA SP, Kit, Chassis PCB	1000SP00189
B	ASENA SP, Kit, Plunger assembly (not shown)	1000SP01113
C	ASENA SP, Kit, Carriage buffer	1000SP00230
D	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466

Front case and subassemblies *(continued)*

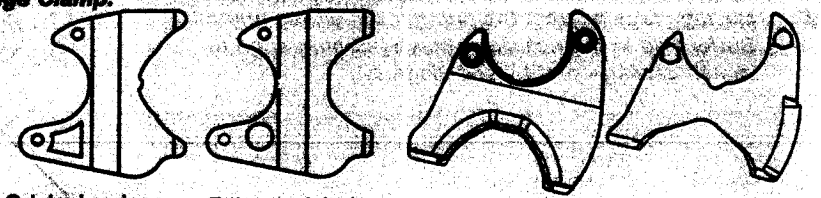
Chassis assembly and Pressure Transducer (Models CC & EP only)

Interchange

1. Carefully peel away the label on the bottom of the front case to gain access to the chassis screw. Remove this screw.
2. Remove the two screws securing the syringe flange clamp.
3. Carefully withdraw the chassis.
4. Remove the two screws from the pressure transducer assembly and carefully withdraw (Models CC & EP only).
5. Reassemble in reverse order.



Syringe Flange Clamp has been enhanced in response to market feedback indicating under certain conditions, false error alarms may occur on the pump close to the End of Infusion (EOI) particularly when syringes of small sizes are used (5,10ml etc.) if incorrectly fitted to the pump.
Fit Enhanced 1 piece Syringe Flange Clamp if serial numbers are within either of the ranges 8001-02315 & below or 8002-04311 & below.
Alternatively the latest 2 piece Syringe Flange Clamp may be fitted if the pump is required to have an EOI point below 5%. Pump must have software versions v1.8.1 or higher if fitting the 2 piece Syringe Flange Clamp.



Original syringe flange clamp | Enhanced 1 piece syringe flange clamp | Enhanced 2 piece syringe flange clamp

Interchange parts

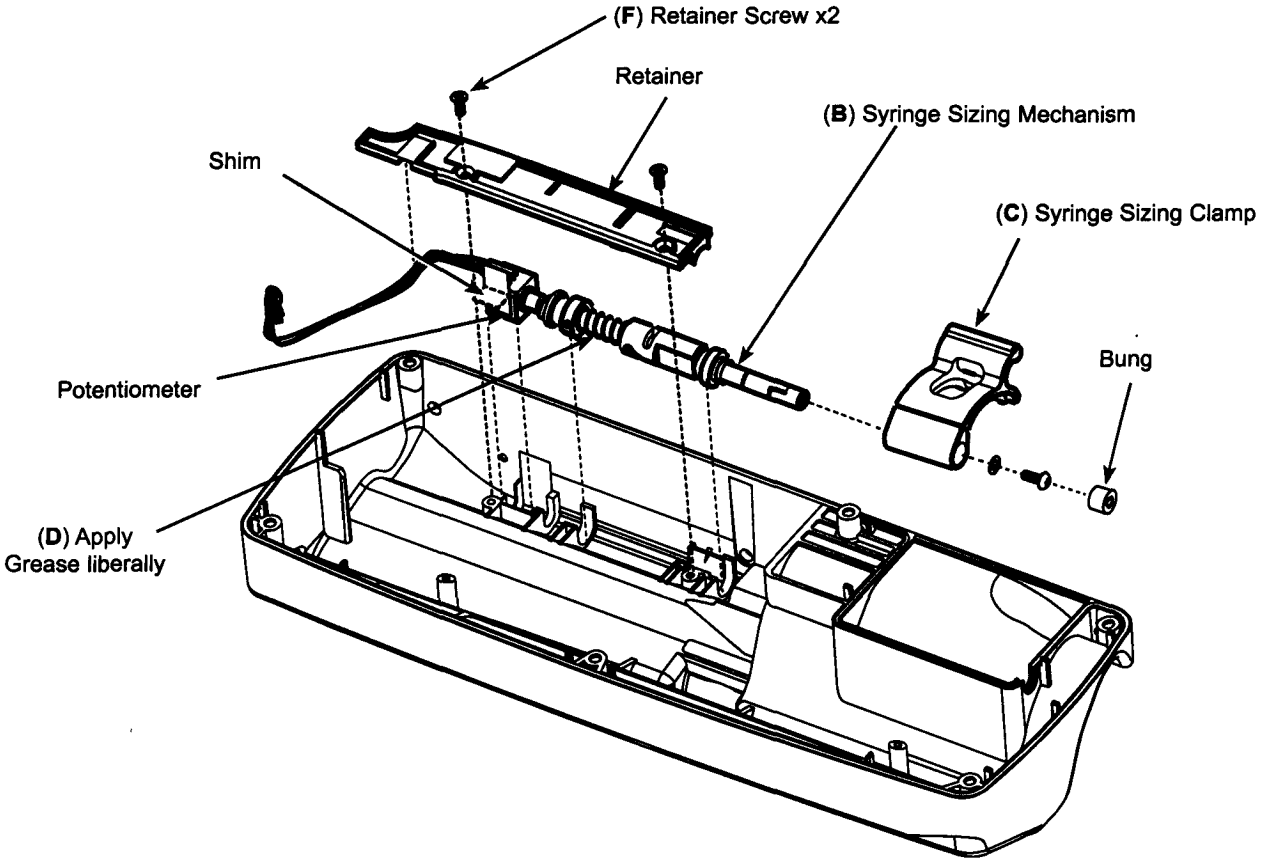
Item	Description	Part Number
A	ASENA SP, Kit, Chassis Assembly	1000SP01112
B	ASENA SP, Kit, Syringe Flange Clamps (1 piece)	1000SP00577
B	ASENA SP, Kit, Syringe Flange Clamps (2 piece)	1000SP00570
C	ASENA CC, Kit, Pressure Transducer	1000SP01155
D	ASENA SP, LBL, Label Chassis Screw Cover	1000LB00431
E	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466

Front case and subassemblies *(continued)*

Front case – Syringe Sizing assembly

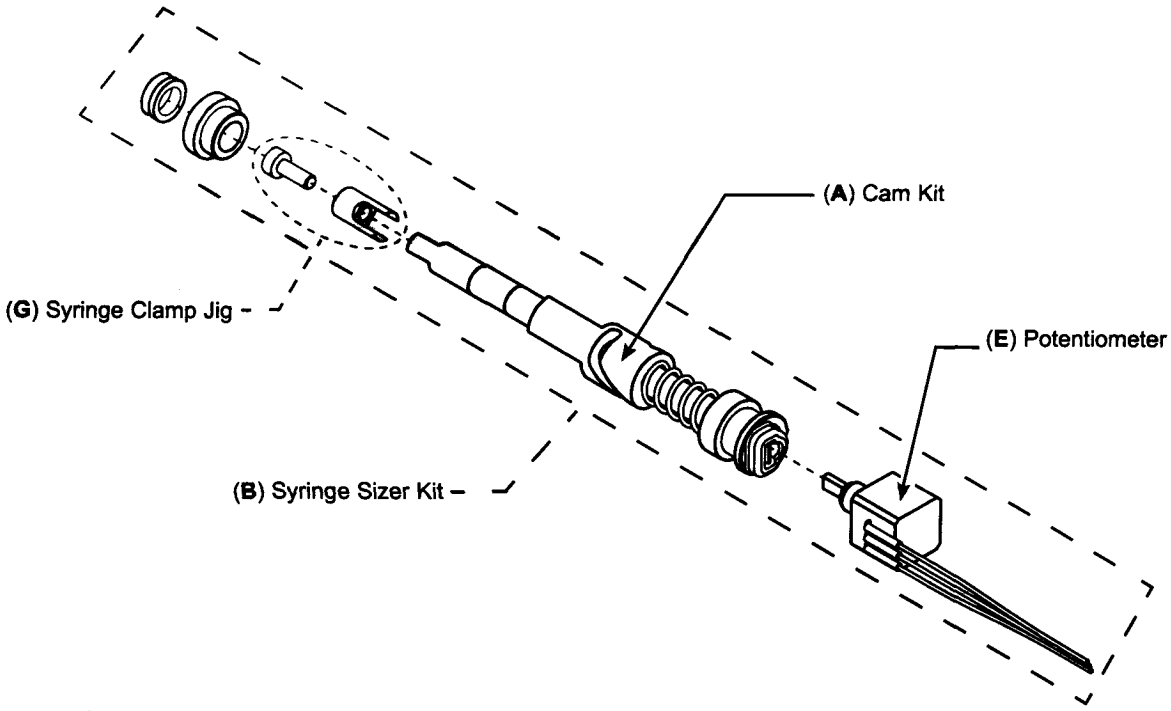
Interchange

1. Remove the syringe sizing retainer screws, case brace and retainer.
2. Remove the shim and discard, then lever the syringe sizing mechanism from the housing and withdraw the potentiometer.
3. Pull the syringe clamp back to its full extent. Carefully remove the bung, screw and washer. Pull hard on the syringe clamp to remove.
4. **Carefully lever the syringe sizing mechanism from the housing and pull through the case. Remove the shaft bearing and the v-ring seal.**
5. Secure the assembly loading jig to the syringe sizing mechanism. Fit the shaft bearing and v-ring seal onto the end of the jig.



6. Lay the assembly on one side, potentiometer to the left, wires exiting upwards. The injection 'pip' feature on the pre-moulded shaft should be visible.
7. Fit the seal protector into the upper case and load the syringe sizing mechanism. Compress the v-seal against the protector.
8. Withdraw the protector and push the syringe sizing mechanism through the hole in the front case until the flat sides locate in the case and the potentiometer aligns with the case recess. Ensure the moulding pip is located on the side.
9. Slide the shim component down the side wall of the syringe potentiometer recess. Bend the shim 'outward'.
10. Fit the syringe sizing retainer so that the shim is visible protruding from the retainer. Fit the case brace. Secure with two screws.
11. Remove the assembly loading jig.
12. The syringe shaft flats to be moved into the open position.
13. Fit the syringe clamp over the shaft, fit the screw, washer and bung into the shaft end.

Front case and subassemblies *(continued)*



Check the performance of cases. If edges are damaged, or the cam has sharp edges, fit the Cam Kit on reassembly. If the cam has sharp edges or the shim is folded incorrectly, these may cause excessive wear of areas around the front case. Mechanical movement and small changes in the syringe diameter can result in a syringe detect failure, which may occur if shim is not present or case is worn.

If pump has serial numbers within either of the ranges 8001-02574 & below or 8002-04776 & below fit enhanced syringe clamp 1000SP01123 on reassembly. Old syringe clamps can be recognised as clear plastic; new syringe clamps are solid blue plastic. Old syringe clamps may crack and fail after being subjected to isopropyl alcohol used in the cleaning process.

Replace the foot last if replacing the case. If fitting a new syringe sizing mechanism, apply generous amounts of grease (CASTROL LMX) to the slot of the mechanism and lightly grease the v-seal.

Interchange parts

Item	Description	Part Number
A	ASENA SP, Kit, CAM Kit	1000SP00170
B	ASENA SP, Kit, Syringe Sizer (see previous page)	1000SP01116
C	ASENA SP, Kit, Syringe & Flange Clamps (see previous page)	1000SP01123
D	ASENA Kit Grease LMX	1000SP01144
E	ASENA SP, Assy, Syringe Size Potentiometer	1000SP01125
F	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466
G	ASENA SP, Test, Syringe Clamp Jig	1000SP00481

Front case and subassemblies *(continued)*

Chassis assembly breakdown

Interchange

1 Remove the pulley nut, washers and withdraw the pulley and toothed belt.

2 Remove three screws securing stepper motor.

3. Remove the leadscrew by driving out the roll pin using a suitable punch.

4. Remove three screws securing motor plate.

5. Remove three screws securing bearing block.

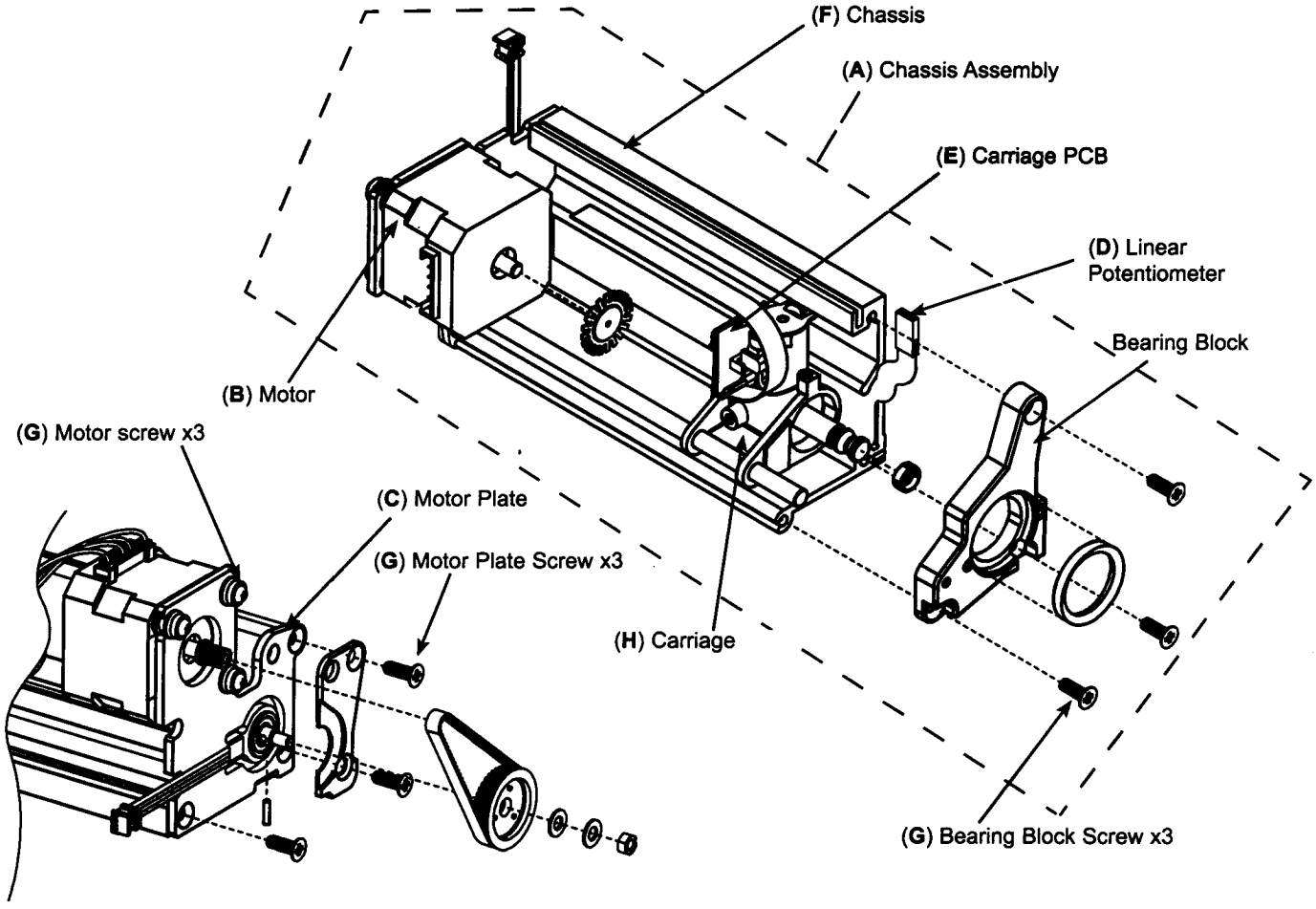
6. Refit plunger into carriage, declutch plunger and withdraw plunger and carriage. Hold linear potentiometer actuator and spring on the side of the carriage.

7. Remove one screw holding carriage PCB.

8. Remove the linear travel potentiometer.

9. Fit new linear potentiometer to centre area of chassis and flush to rear of chassis slot and flush to motor-plate end.

10. Reassemble in reverse order



Interchange parts

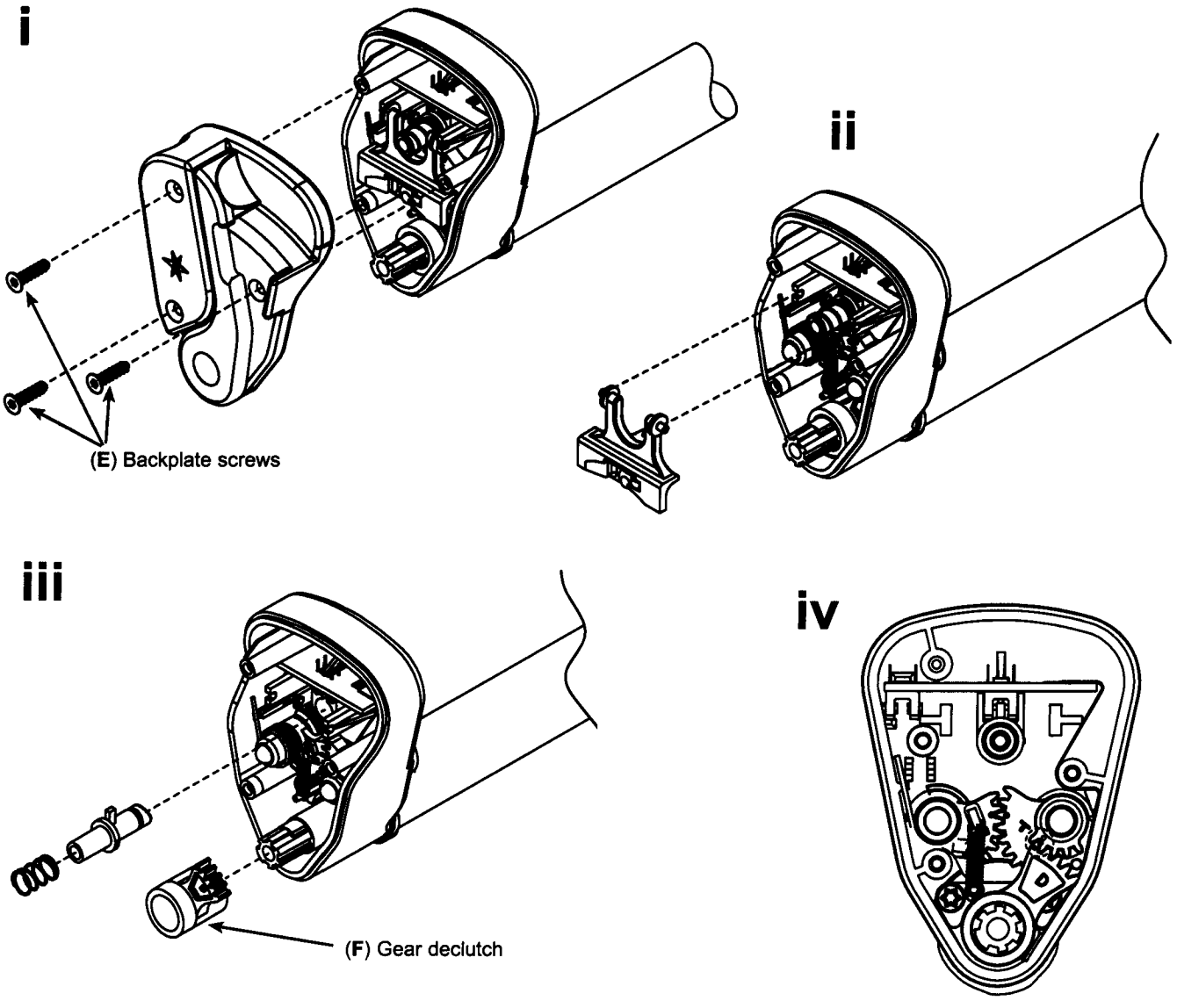
Item	Description	Part Number
A	ASENA SP, Kit, Chassis Assembly	1000SP01112
B	ASENA SP, Kit, Stepper Motor	1000SP01109
C	ASENA SP, Kit, Motor Plate	1000SP01110
D	ASENA SP, Assy, Linear Potentiometer	1000ME01451
E	ASENA SP, Carriage PCB	8000EL00022
F	ASENA SP, Kit, Chassis Enhancement	1000SP01136
G	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466
H	Spare Carriage Asena	1000SP01107

Front case and subassemblies *(continued)*

Plunger assembly breakdown

Interchange

1. Remove three screws holding plunger backplate.
2. Remove components as required. Follow diagrams step ii to step ix.
3. Reassemble in reverse order.



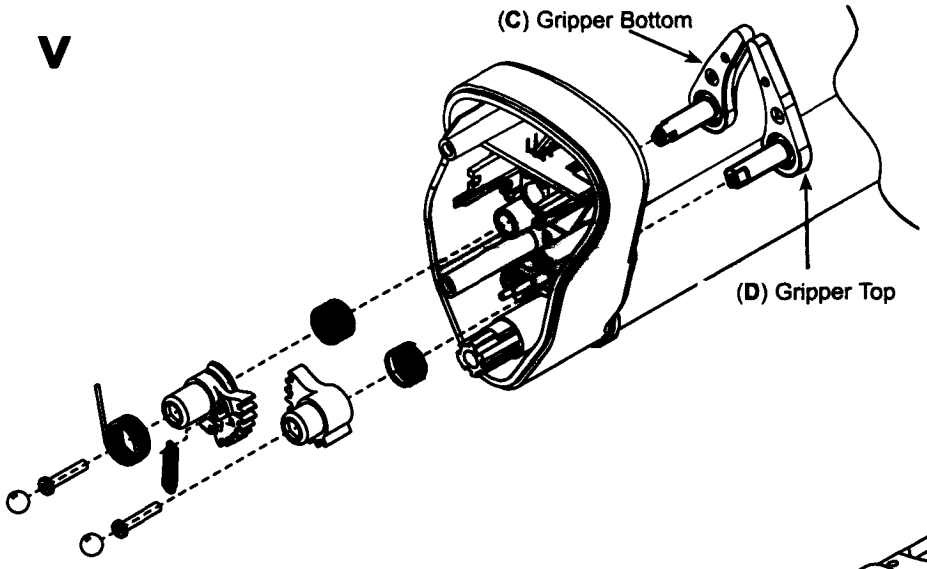
Interchange parts

Item	Description	Part Number
A	ASENA SP, Kit, Plunger Assembly (Complete Plunger Assembly, not shown)	1000SP01113
B	ASENA SP, Plunger Detect PCB	8000EL00019
C	ASENA SP, Gripper Bottom	1000ME01218
D	ASENA SP, Gripper Top	1000ME01219
E	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466
F	GEAR DECLUTCH	1000ME01198

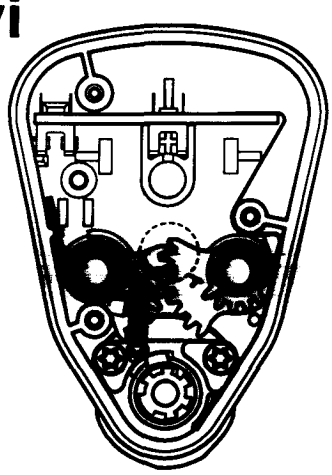
Front case and subassemblies *(continued)*

Plunger assembly breakdown (continued)

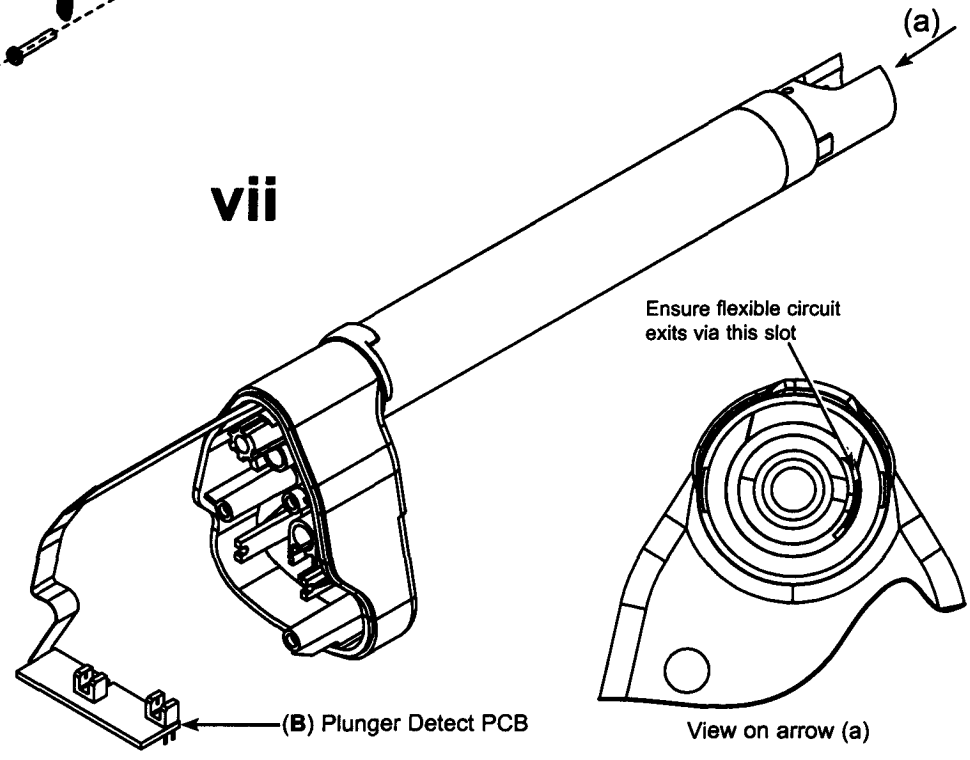
v



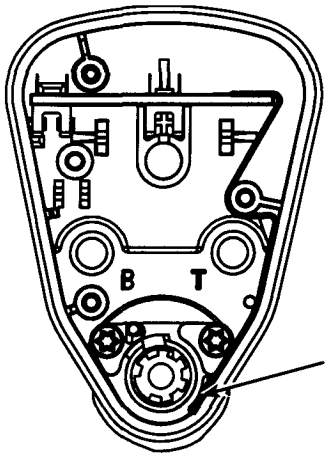
vi



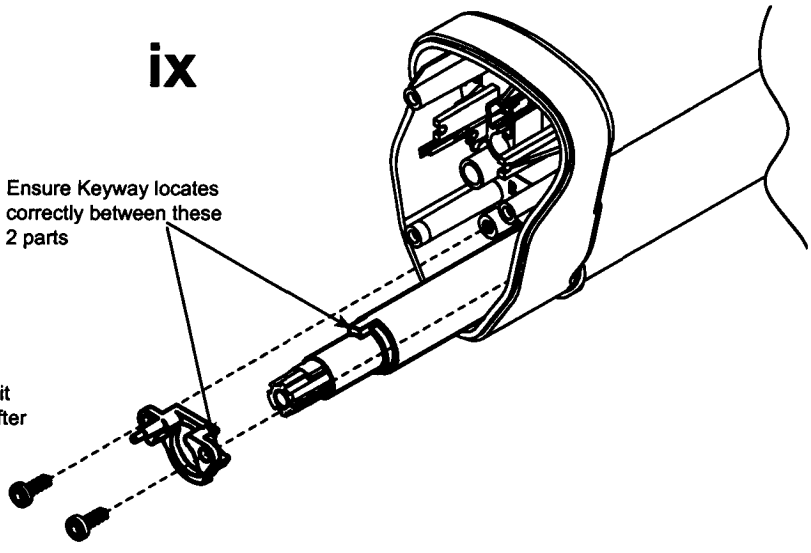
vii



viii



ix

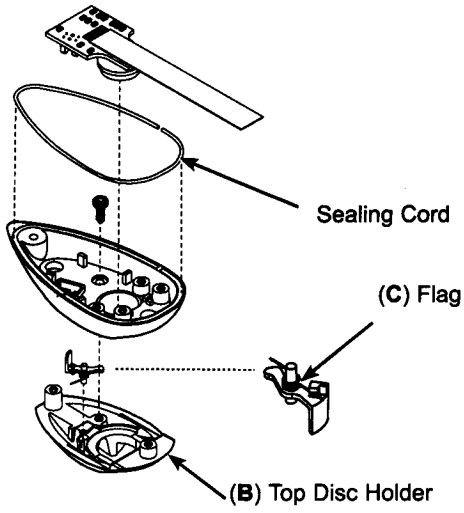


Pressure Transducer Assembly (Models CC & EP only)

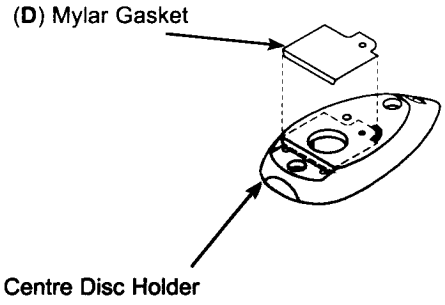
The following instructions detail the fitting of the Pressure Transducer Assembly.

Interchange

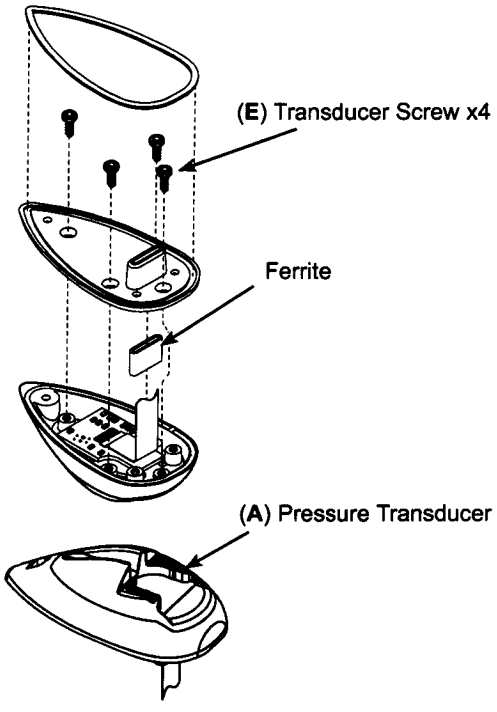
1. Fit the mylar gasket.
2. Align the hole in the gasket with the hole in the centre disc holder and ensure label is square to the Centre Disc Holder.
3. **Use a clean wipe and apply pressure to the mylar gasket.**
4. Crease the mylar gasket along the ledge of the centre disc holder and ensure it is well adhered along the front face of the step edge.
5. Load the spring onto the disc-detect flag shaft.



12. Once the PCB is located, apply pressure over the sensor area of the PCB to ensure good location.
13. Slide the flexible circuit ferrite into place and ensure the flexible circuit is formed at 90° to the PCB.
14. Lower the Base Disc Holder onto the Centre Disc Holder.
15. Secure the base with the screws.
16. Use a lint-free cloth and approved cleaner to wipe the surface clean.
17. Start the gasket at the pointed end. Work around the perimeter and minimise the gap at the join (if using cord - N/A if using single-piece gasket).



6. Locate spring arms to spring retainer on the flag and to the recess in the disc holder top.
7. Rotate and install the plastic flag.
8. Fit the sealing cord starting at the break bar.
9. Load the disc holder centre onto the disc holder top.
10. Secure disc holder centre to disc holder top using screw.
11. Load pressure transducer into assembled housing.



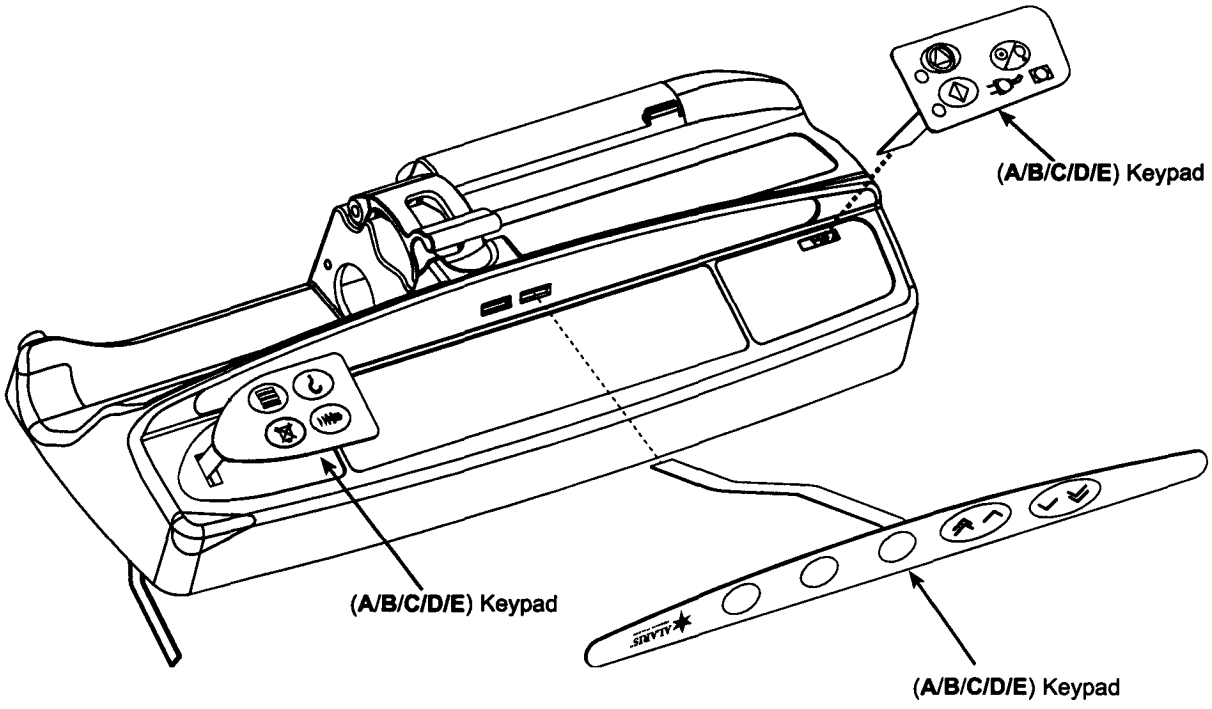
Interchange parts

Item	Description	Part Number
A	ASENA CC, Kit, Pressure Transducer	1000SP01155
B	ASENA CC, Assy, Top Disc Holder	1000ME00450
C	ASENA CC, Assy, Flag Disc Holder	1000ME01318
D	ASENA CC, Assy, Gasket Mylar	1000ME01319
E	ASENA SP, Kit, Fixings (screws, washers etc)	1000SP00466

Keypads and labels

Interchange

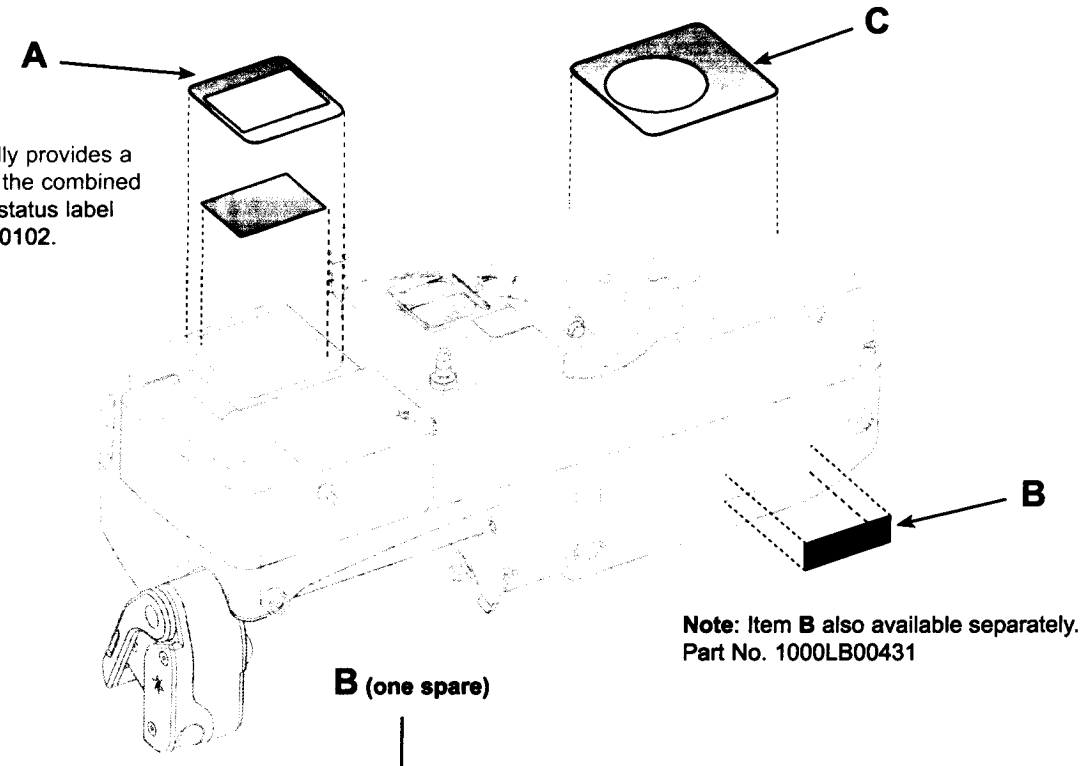
1. Discard any keypads removed as they cannot be reused.
2. Fit replacement keypads after removing backing paper from underside. Handle replacement keypads carefully to avoid damage.
3. Remove label(s) from case as required.
4. Clean case where replacement label(s) to be fitted.
5. **Fit replacement label(s) taken from label sheet as required.**
6. **Ensure all keypad membrane flexi tails are routed and secured with double sided adhesive pads (0000ME00423).**



Interchange parts

Item	Description	Part Number
A	ASENA GH/CC, Key, Switch Overlay Keypad	1000SP01126
B	ASENA GS, Key, Switch Overlay Keypad	1000SP01127
C	ASENA TIVA, Key, Switch Overlay Keypad	1000SP00403
D	ASENA PK, Key, Switch Overlay Keypad	1000SP00659
E	ASENA EP, Key, Switch Overlay Keypad	1000SP00640

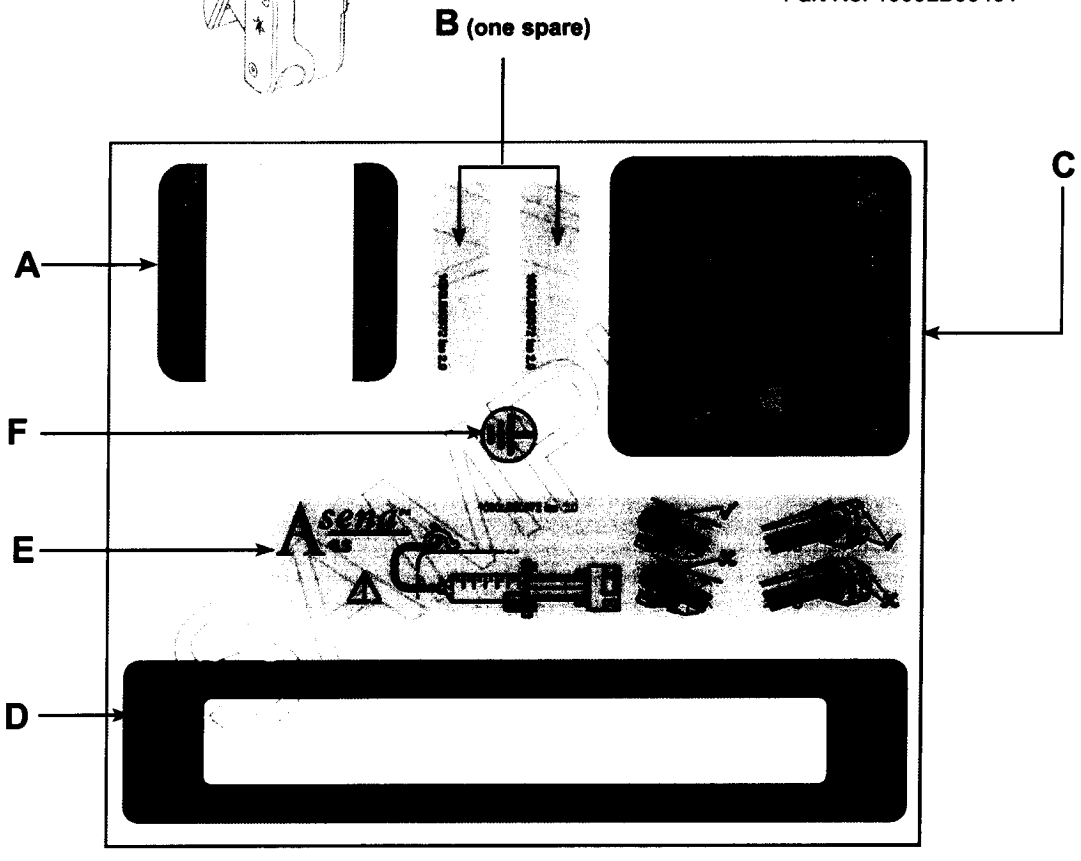
Keypads and labels *(continued)*



Note:

Item **A** additionally provides a clear window for the combined serial number & status label part nr. 1000LB00102.

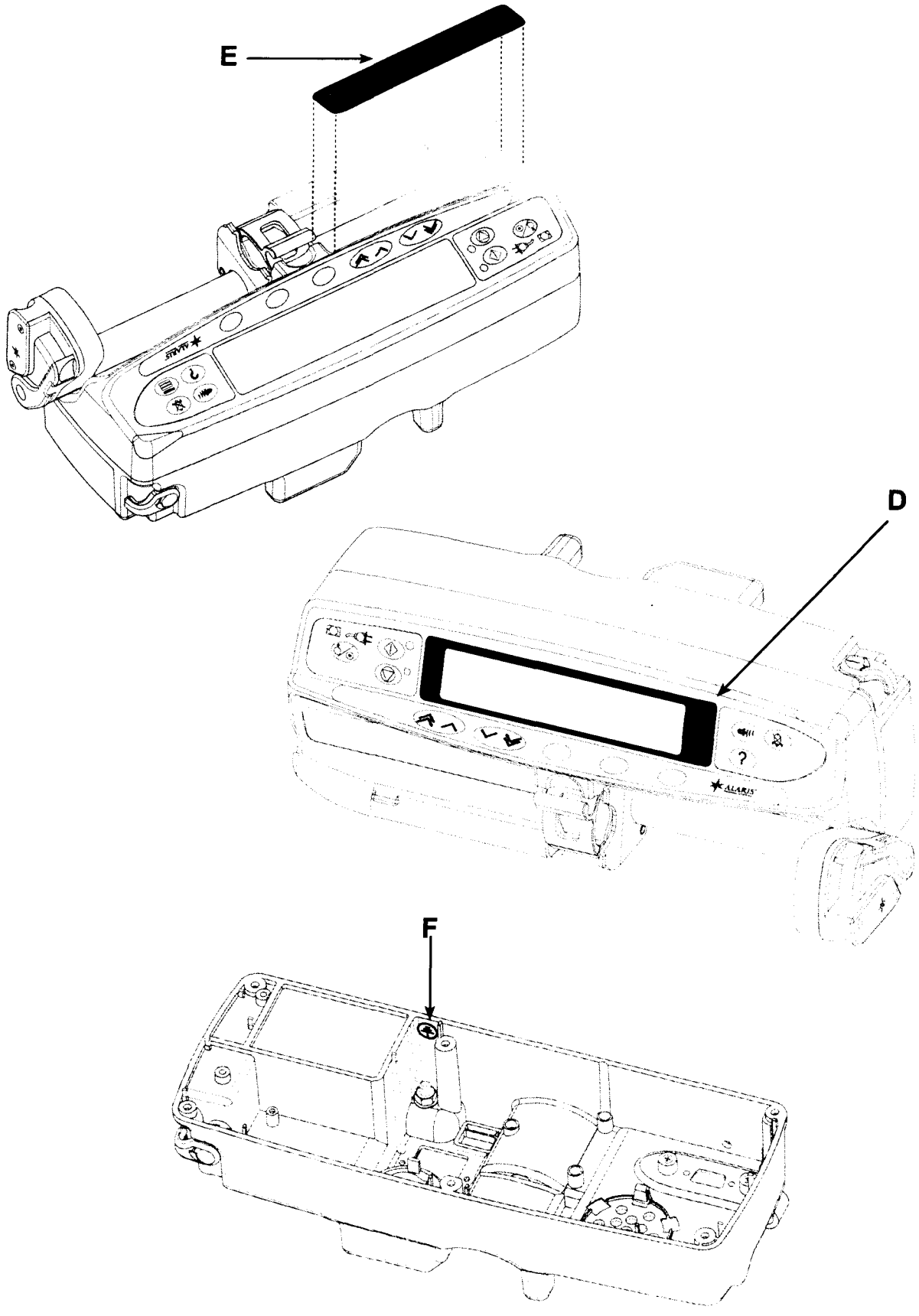
Note: Item **B** also available separately. Part No. 1000LB00431



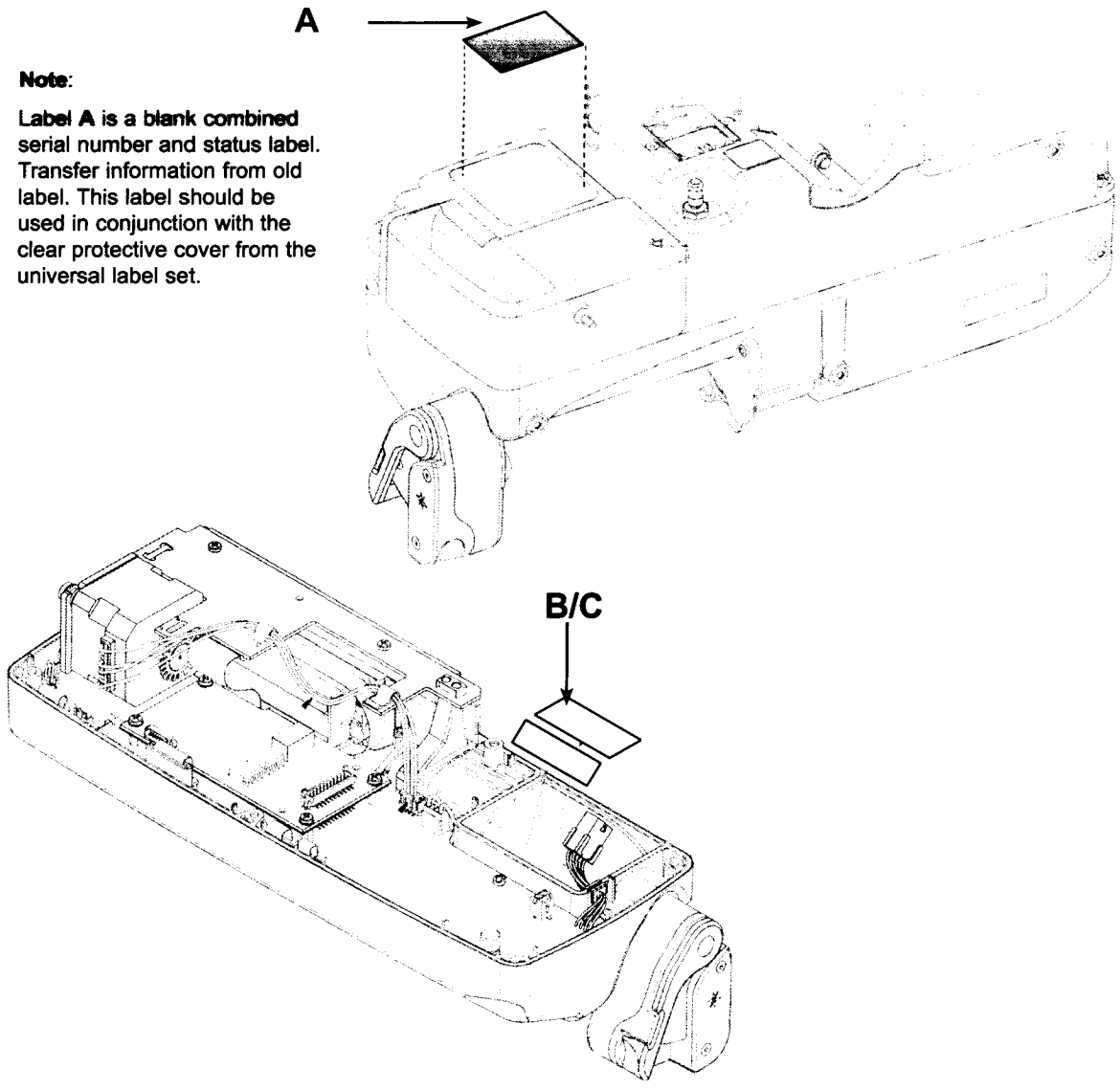
Picture shows Asena® GS Syringe Pump Label Set. Refer to the following model types for correct label set.

Description	Part Number
ASENA CC, Lbl, Label Set Universal	1000LB00342
ASENA GH, Lbl, Label Set Universal	1000LB00363
ASENA GS, Lbl, Label Set Universal	1000LB00372
ASENA TIVA, Lbl, Label Set Universal	1000LB00421
ASENA EP, Lbl, Label Set Universal	1000LB00606
ASENA PK, Lbl, Label Set Universal	1000LB00612

Keypads and labels *(continued)*



Keypads and labels *(continued)*



Note:

Label A is a blank combined serial number and status label. Transfer information from old label. This label should be used in conjunction with the clear protective cover from the universal label set.

The picture above shows the label set that is available as a separate item from the standard Asena® Syringe Pump label sets.

Item	Description	Part Number
ABC	ASENA Label Combined Serial Number & Status	1000LB00102 Use in conjunction with universal label set.

Appendix A

Specifications

In this appendix

Specifications

To be used for reference only, for more detailed specifications refer to relevant Directions For Use. These specifications refer to all models covered by this manual unless otherwise stated.

Infusion

Infusion rate (ml/h)	Models **GH/CC/TIVA/PK/EP**	Model **GS**
5ml syringes	0.1 - 150	0.1 - 150
10ml syringes	0.1 - 300	0.1 - 200
20ml syringes	0.1 - 600	0.1 - 200
30ml syringes	0.1 - 900	0.1 - 200
50ml syringes	0.1 - 1200	0.1 - 200

Volume Infused	0.0 - 9990ml

Bolus rate (ml/h)	Models **GH/CC/PK/EP**	Model **GS**	Model **TIVA**
5ml syringes	10 - 150	10 - 150	150
10ml syringes	10 - 300	10 - 300	150, 300
20ml syringes	10 - 600	10 - 500	150, 300 or 600
30ml syringes	10 - 900	10 - 500	150, 300, 600 or 900
50ml syringes	10 - 1200	10 - 500	150, 300, 600, 900 or 1200

Bolus volume limit	0.5 - 25.0ml
Purge rate (ml/h)	100 - 500
Purge volume	0.5 - 5ml

Keep Vein Open (KVO) rate	0.1ml/h - 2.5ml/h
End Of Syringe rate	Stop, KVO (0.1ml/h to 2.5ml/h), or set rate if lower than KVO.
Volume To Be Infused (VTBI) (Models *CC/GH*/EP)	0.1ml - 100ml, 1min - 24h
VTBI done rate (Models **CC/GH/EP**)	Stop, KVO (0.1ml/h to 2.5ml/h), set rate if lower than KVO or continue at set rate.
Near End Of Infusion alarm	1min - 15min to end of infusion, or 10% of syringe volume, whichever is smaller.
End Of Infusion (EOI) alarm	0.1% - 5% of syringe volume.
Pumping pressure limit	L-1 to L-10 (100mmHg to 1000mmHg approx) L-0 (50mmHg approx)

Occlusion accuracy with pressure set (% of full scale) (Models **CC & EP**):

Pressure (mmHg)	**0**	**25**	**500**	**1000**
At 23°C	±2%	±4%	±5%	±6%
Between 5°C and 40°C	±4%	±7%	±7%	±10%

System accuracy	Volumetric Mean ± 2% (nominal)

Electrical

Battery type	NiMH sealed rechargeable 7.2V/2.7Ah.
Battery life	Typically 4h from fully charged @ 5.0ml/h & 20°C under nominal conditions.
Battery charging	2.5h from fully discharged to 90% charged.
Fuse type	2 x T-1.25A, slow blow.
AC power supply	115/230VAC, 50/60Hz, 20VA (nominal).
Electrical safety	Class I Type CF.

Physical

Weight 2.6 kg (excluding power cable)

Dimensions

Models	W	H	D
GS/GH/PK	310mm	121mm	200mm
CC/EP	335mm	121mm	200mm
TIVA	310mm	121mm	200mm

Environmental

IPX Rating IPX1

Operating limits

Temperature	+5°C to +40°C
Relative humidity	20% to 90%
Atmospheric pressure	700hPa to 1060hPa

Transport limits

Temperature	-30°C to +50°C
Relative humidity	10% to 95%
Atmospheric pressure	500hPa to 1060hPa

Recycling

Disposal of device components

Caution: Follow local governing ordinances and recycling instructions regarding disposal or recycling of device components, including batteries.

Electromagnetic Compatibility

Warning:

- The use of any accessory, transducer, or cable with the Asena® Syringe Pump other than those specified may result in increased emissions or decreased immunity of the pump.
- The Asena® Syringe Pump should not be used adjacent to or stacked with other equipment and that is adjacent or stacked use is necessary, the Asena® Syringe Pump should be observed to verify normal operation in the configuration in which it will be used.

Caution:

- **The Asena® Syringe Pump is a CISPR 11 Group 1 Class A Medical Equipment System and intended for use by healthcare professionals only.**
- Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed, put into service and used according to the EMC information provided in the accompanying documents.
- Portable and Mobile RF communications can affect Medical Electrical Equipment.
- Operating the pump near equipment which radiates high energy radio frequencies (electro surgical or cauterizing equipment, portable radios, cellular telephones, etc.) may cause false alarm conditions. If this happens, reposition the pump away from the source of interference or turn off the pump and manually regulate the flow.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions		
The Asena® Syringe Pump is intended for use in the electromagnetic environment specified below. The customer or the user of the Asena® Syringe Pump should assure that it is used in such an environment.		
Emissions Test	**Compliance**	**Electromagnetic Environment – Guidance**
CISPR 11 RF Emissions	Group 1	The pump uses RF energy only for its internal function in the normal product offering. Therefore, its RF emissions are very low and are not likely to cause any interface in nearby electronic equipment.
CISPR 11 RF Emissions	Class A	The pump is suitable for use in all establishments, other than domestic, and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
EN 61000-3-2 Harmonic Emissions	Class A	
EN 61000-3-3 Voltage Fluctuations, Flicker Emissions	Complies	

Electromagnetic Compatibility *(continued)*

Guidance and Manufacturer's Declaration - Electromagnetic Immunity			
The Asena® Syringe Pump is intended for use in the electromagnetic environment specified below. The customer or the user of Asena® Syringe Pump should assure that it is used in such an environment.			
Immunity Test	**EN 60601-1-2 Test Level**	**Compliance Level**	**Electromagnetic Environment – Guidance**
EN 61000-4-2 Electro-Static Discharge (ESD)	**±6 kV contact** **±8 kV air**	**±8 kV contact (Note 2)** **±15 kV air (Note 2)**	**Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.** If connector testing exemption is used, the following symbol for ESD sensitivity appears adjacent to each connector. "Caution – Do Not Touch". 
EN 61000-4-4 Electrical Fast Transient, Burst (EFT) (Note 3)	±2 kV for power supply lines ±1 kV for input/ output lines	±2 kV for power supply lines N/A (Note 4)	Mains power quality should be that of a typical commercial or hospital environment.
EN 61000-4-5 Power Line Surge (Note 3)	±1 kV Line(s) to Line(s) ±2 kV Line(s) to Earth	±1 kV Line(s) to Line(s) ±2 kV Line(s) to Earth	Mains power quality should be that of a typical commercial or hospital environment.
EN 61000-4-8 Power Frequency Magnetic Field (50/60 Hz)	3 A/m	400 A/m 50 Hz (Note 2)	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
EN 61000-4-11 Voltage Dips, Short Interruptions, and Voltage Variations (Note 3)	<5 % U_T (Note 1) (>95 % dip in U_T) for 0.5 cycle	<5 % U_T (>95 % dip in U_T) for 0.5 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of the pump requires continued operation during power mains interruptions, it is recommended that the pump be powered from an uninterruptible power supply or a battery. The pump does employ an internal short duration battery.
	40 % U_T (60 % dip in U_T) for 5 cycles	40 % U_T (60 % dip in U_T) for 5 cycles	
	70 % U_T (30 % dip in U_T) for 25 cycles	70 % U_T (30 % dip in U_T) for 25 cycles	
	<5 % U_T (>95 % dip in U_T) for 5 sec	<5 % U_T (>95 % dip in U_T) for 5 sec	

Note 1—U_T is the AC mains voltage prior to application of the test level.
Note 2—Compliance levels raised by EN 60601-2-24.
Note 3—Performed at the Minimum and Maximum Rated Input Voltage.
Note 4—Alaris Medical Systems recommends using signal cables of less than 3 meters in length and this requirement is applicable only if signal cables are 3 meters or more in length. (EN 60601-1-2:2002, Clause 36.202.4)

Electromagnetic Compatibility *(continued)*

Guidance and Manufacturer's Declaration—Electromagnetic Immunity
LIFE SUPPORT Equipment

The Asena® Syringe Pump is intended for use in the electromagnetic environment specified below. The customer or the user of the Asena® Syringe Pump should ensure that it is used in such an environment.

Immunity Test	EN 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment – Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the pump, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. ***Recommended Separation Distance*** $d = \left[\frac{3.5}{V_1}\right]\sqrt{P}$
EN 61000-4-6 Conducted RF	3 V rms 150 kHz to 80 MHz	10 V rms (Note 3)	
EN 61000-4-3 Radiated RF	3 V/m 80 MHz to 2.5 GHz	10 V/m (Note 3)	$d = \left[\frac{12}{V_2}\right]\sqrt{P}$ 80 MHz to 800 MHz $d = \left[\frac{12}{E_1}\right]\sqrt{P}$ 80 MHz to 2.5 GHz $d = \left[\frac{23}{E_1}\right]\sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).[a] Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [b] should be less than the compliance level in each frequency range. [c] Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1—At 80 MHz and 800 MHz, the higher frequency range applies.
Note 2—These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.
Note 3—Compliance levels raised by EN 60601-2-24.

[a] The compliance levels in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz are intended to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas. For this reason, an additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in these frequency ranges.

[b] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the pump is used exceeds the applicable RF compliance level above, the pump should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the pump.

[c] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 10 V/m.

Electromagnetic Compatibility *(continued)*

Recommended Separation Distances for LIFE SUPPORT Equipment between portable and mobile RF communications equipment and the Asena® Syringe Pump

The Asena® Syringe Pump is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled.
The user of the Asena® Syringe Pump can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Asena® Syringe Pump as recommended below, according to the maximum output power of the communications equipment.

Rated Maximum Output Power of Transmitter W	**Separation Distance According to Frequency of Transmitter** m			
	150 kHz to 80 MHz Outside ISM bands $d = [\frac{3.5}{V1}]\sqrt{P}$	**150 kHz to 80 MHz In ISM bands** $d = [\frac{12}{V2}]\sqrt{P}$	**80 MHz to 800 MHz** $d = [\frac{12}{E1}]\sqrt{P}$	**800 MHz to 2.5 GHz** $d = [\frac{23}{E1}]\sqrt{P}$
0.01	0.03	0.12	0.12	0.23
0.1	0.11	0.38	0.38	0.73
1	0.35	1.20	1.20	2.30
10	1.11	3.80	3.80	7.28
100	3.50	12.00	12.00	23.00

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1—At 80 MHz and 800 MHz, the separation distance for the higher frequency range apply.
Note 2—The ISM (Industrial, Scientific, and Medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.
Note 3—An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas.
Note 4—These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

Appendix B

Spare Parts Listing

In this appendix

Electrical parts listing

Part Number	*Description*
1000EL00222	ASENA SP, FUSE, T-1.25A SLOW BLOW, MAINS
1000SP00189	ASENA SP, KIT, CHASSIS PCB
1000SP00497	ASENA TIVA, CONTROL PCB (Software V2.2.1)
1000SP01118	ASENA GS, DISPLAY PCB
1000SP01119	ASENA GH/CC/TIVA, DISPLAY PCB
1000SP00495	ASENA GH, CONTROL PCB (Software V2.2.1)
1000SP01122	ASENA SP, ASSY, BATTERY
1000SP01124	ASENA SP, KIT, MAINS INLET
1000SP01125	ASENA SP, ASSY, SYRINGE SIZE POTENTIOMETER
1000SP01130	ASENA SP, KIT, SPEAKER
1000SP00494	ASENA GS, CONTROL PCB (Software V2.2.1)
1000SP01155	ASENA CC, KIT, PRESSURE TRANSDUCER
1000SP01160	ASENA SP, KIT, RS232 (PCB & FIXINGS)
1000SP00496	ASENA CC, CONTROL PCB (Software V2.2.1)
8000EL00019	ASENA SP, PLUNGER DETECT PCB
8000EL00022	ASENA SP, CARRIAGE PCB
8000EL00063	ASENA SP, ASSY, POWER SUPPLY UNIT (PSU)

Front case parts listing

Part Number	*Description*
1000SP01153	ASENA CC, KIT, FRONT CASE
1000SP00478	ASENA GS, KIT, FRONT CASE
1000SP00479	ASENA GH, KIT, FRONT CASE
1000SP00480	ASENA TIVA , KIT, FRONT CASE
1000SP00641	ASENA EP , KIT, FRONT CASE
1000SP00658	ASENA PK , KIT, FRONT CASE
1000SP01167	ASENA SP, KIT, SPARE FOOT
1000SP01137	ASENA GH/CC/TIVA, KIT, DISPLAY PROTECTION
1000SP01123	ASENA SP, KIT, SYRINGE & FLANGE CLAMPS
1000SP01116	ASENA SP, KIT, SYRINGE SIZER
1000SP00122	ASENA GS, ASSY, WINDOW ADAPTOR DISPLAY
1000SP00187	ASENA GS, ASSY, DISPLAY INSULATOR
1000SP00188	ASENA GH/CC/TIVA, ASSY, DISPLAY INSULATOR
0000ME00423	PAD SELF ADHESIVE DOUBLE SIDED 12x12mm
1000ME00261	ASENA SP, ASSY, BRACKET DISPLAY MOUNTING
1000ME01301	ASENA SP, ASSY, GASKET DISPLAY
1000ME00450	ASENA CC, ASSY, TOP DISC HOLDER
1000ME01318	ASENA CC, ASSY, FLAG DISC HOLDER
1000ME01319	ASENA CC, ASSY, GASKET MYLAR
1000ME00311	ASENA SP, CASE SEALING CORD (1m)
1000SP00466	ASENA SP, KIT, FIXINGS (SCREWS,WASHERS,ETC)

Rear case parts listing

Part Number	*Description*
1000SP01115	ASENA GS/GH/TIVA, KIT, REAR CASE
1000SP01154	ASENA CC, KIT, REAR CASE
1000SP01121	ASENA SP, BATTERY COVER/HANDLE
1000SP00593	ASENA SP, KIT, SPARE ADHESIVE FOOT RIVET REPLACEMENT
1000SP00595	ASENA SP, KIT, SPARE ADHESIVE FOOT
1000SP01114	ASENA SP, KIT, RAIL CAM
1000SP00115	**ASENA SP, ASSY, POLE CLAMP**
1000ME01213	**ASENA SP, TUBE RESTRAINT BLANK**
1000ME01214	ASENA SP, TUBE RESTRAINT RS232
1000ME01303	MAGNET IR DETECT
1000ME01306	ASENA SP, ASSY, PSU INSULATOR
1000ME01317	ASENA CC, ASSY, PLUG BLANKING TRANSDUCER
1000SP00466	ASENA SP, KIT, FIXINGS (SCREWS,WASHERS,ETC)
1000SP00467	ASENA SP/GW, KIT, PE STUD
1000SP00468	ASENA SP/GW, KIT, RS232 CONNECTOR
1000SP00589	SPARE KIT POLE CLAMP ARM
1000SP00483	SPARE POLE CLAMP ARM KIT ASENA SP/GW

Keypads and labels

Part Number	*Description*
1000LB00342	ASENA CC, LBL, LABEL SET UNIVERSAL
1000LB00363	ASENA GH, LBL, LABEL SET UNIVERSAL
1000LB00372	ASENA GS, LBL, LABEL SET UNIVERSAL
1000LB00421	ASENA TIVA, LBL, LABEL SET UNIVERSAL
1000LB00606	ASENA EP, LBL, LABEL SET UNIVERSAL
1000LB00612	ASENA PK, LBL, LABEL SET UNIVERSAL
1000SP01126	ASENA GH/CC, KEY, SWITCH OVERLAY KEYPAD
1000SP01127	ASENA GS, KEY, SWITCH OVERLAY KEYPAD
1000SP00403	ASENA TIVA, KEY, SWITCH OVERLAY KEYPAD
1000SP00659	ASENA PK, KEY, SWITCH OVERLAY KEYPAD
1000SP00640	ASENA EP, KEY, SWITCH OVERLAY KEYPAD
1000LB00431	ASENA SP, LBL, LABEL CHASSIS SCREW COVER

Transmission parts listing

Part Number	*Description*
1000ME01218	ASENA SP, GRIPPER BOTTOM
1000ME01219	ASENA SP, GRIPPER TOP
1000SP00230	ASENA SP, KIT, CARRIAGE BUFFER
1000SP01109	ASENA SP, KIT, STEPPER MOTOR
1000SP01112	ASENA SP, KIT, CHASSIS ASSEMBLY
1000SP01113	ASENA SP, KIT, PLUNGER ASSEMBLY
1000SP01136	ASENA SP, KIT, CHASSIS ENHANCEMENT
1000SP01110	ASENA SP, KIT, MOTOR PLATE
1000ME01451	ASENA SP, ASSY, LINEAR POTENTIOMETER
1000SP01107	SPARE CARRAIGE ASENA
1000ME01198	GEAR DECLUTCH

Software

Part Number	*Description*
1000SP00229	ASENA CC, SOFT, SOFTWARE CD V1.5.10 (MK1 & 2)
1000SP00243	ASENA GS, SOFT, SOFTWARE CD V1.5.10 (MK1 & 2)
1000SP00244	ASENA GH, SOFT, SOFTWARE CD V1.5.10 (MK1 & 2)
1000SP00453	ASENA TIVA, SOFT, SOFTWARE CD V1.6.2 (MK1 & 2)
1000SP00567	ASENA CC, SOFT, SOFTWARE CD V1.8.1 (MK1 & 2)
1000SP00565	ASENA GS, SOFT, SOFTWARE CD V1.8.1 (MK1 & 2)
1000SP00566	ASENA GH, SOFT, SOFTWARE CD V1.8.1 (MK1 & 2)
1000SP00568	ASENA TIVA, SOFT, SOFTWARE CD V1.8.1 (MK1 & 2)
1000SP00500	ASENA CC, SOFT, SOFTWARE CD V2.0.0 (MK3)
1000SP00498	ASENA GS, SOFT, SOFTWARE CD V2.0.0 (MK3)
1000SP00499	ASENA GH, SOFT, SOFTWARE CD V2.0.0 (MK3)
1000SP00501	ASENA TIVA, SOFT, SOFTWARE CD V2.1.0 (MK3)
1000SP00574	ASENA CC, SOFT, SOFTWARE CD V2.2.1 (MK3)
1000SP00572	ASENA GS, SOFT, SOFTWARE CD V2.2.1 (MK3)
1000SP00573	ASENA GH, SOFT, SOFTWARE CD V2.2.1 (MK3)
1000SP00575	ASENA TIVA, SOFT, SOFTWARE CD V2.2.1 (MK3)
1000SP00614	ASENA PK, SOFT, SOFTWARE CD V3.2.5 (MK3)

Test equipment

Part Number	*Description*
0000JG00047	ASENA SP, TEST, CASE CRADLE JIG
0000JG00053	ASENA SP, TEST, PE STUD SOCKET
0000TG00080	ASENA SP & P SERIES, TEST, RATE GAUGE
1000TG00095	LINEAR SIZING SPACER BOM
1000SP00065	ASENA SP & P SERIES, KIT, CALIBRATION TOOLS
1000SP00172	ASENA SP, KIT, IRDA PORT CABLE & HEADER PCB
1000SP00209	ASENA SP, KIT, EVENT LOG DOWNLOAD UTILITY
0000JG00014	ASENA SP & P SERIES, TEST, PLUNGER PROTECT
1000SP00336	ASENA, ASSY, RS232 CABLE
1000SP00481	ASENA SP, TEST, SYRINGE CLAMP JIG
1000ME01466	POLE CLAMP SNAKE EYE DRIVER
0000TG00200	DIGITAL OCCLUSION TEST GEAR

Appendix C

Fitting & Replacement Guidelines

In this appendix

General assembly information

1. A wide range of self-tapping fasteners are available.
2. PT screws are for plastic, self-tapping applications.
3. TAPTITE screws are for metal self thread-forming applications. These can be recognised by a triangular cross-section on the end.
4. Almost all fasteners on the Asena® Syringe Pumps are self-tapping and have the potential to be over-tightened (over-torqued).
5. The force required to create a thread for the first time is more than when reassembling a previously made joint.
6. **Always use the correct torque level when first making an assembly stage.**
7. **Take care with the torque applied when re-assembling parts. Less torque is required, so a hand tool may be more** appropriate.
8. In many situations a stripped thread will require replacement of the failed component.
9. The head patterns of the fasteners are of the following types:
   - Pozi Number 1 (smaller X head)
   - Pozi Number 2 (larger X head)
   - Torx Number T8 (Small star profile, used typically on countersunk parts with smaller heads - Backplate / Mains Inlet / Carriage PCB screw).
   - Torx Number T10 (Medium star profile, used on the majority of Asena® Syringe Pump Torx fasteners)
   - Torx Number T20 (Larger star shape, typically for case securing screws)
   - M3 (Hex head with 5.5mm across flats (AF) drivers)
   - M4 nuts (Hex head with 7mm across flats (AF) drivers)
10. Always select the correct tool and bit pattern for the fastener.

Torque guide

1. When selecting a torque for a servicing activity, be aware that refastening will require less torque than the initial manufacture.
2. Use this information as a guide to the 'do not exceed' torque levels when servicing the equipment. When servicing it is recommended that torque is applied gradually until the component is secure. In any process do not exceed the stated levels.
3. If a torque driver is available for servicing this will help control the applied torque. Otherwise, be aware that excess force may cause the component to fail.

Plunger Drive Assembly:

Stage Description	Component Description	Qty	Established Process Torque
Intermediate Tube Bearing Plate	Screw - PT K30x8 Pan Hd Torx (T10)	2	50 cNm
Fixing Gripper Gears	Screw - PT K22x12 Pan Hd (T6)	2	50 cNm
Screw on the Backplate Assembly	Screw - PT K30x12 Csk Torx (T8) Rogard	3	40 cNm

Main Chassis Assembly:

Stage Description	Component Description	Qty	Established Process Torque
Mount motor onto motor plate	Screw - M3x12 Pan Hd Torx (T10)	3	60 cNm
Mount motor plate to chassis assembly	Screw - Taptite M4x10 Csk Pozi	3	1.0 Nm
Attach drive belt and leadscrew pulley	Nut - M4 Full	1	40 cNm
Secure Carriage PCB to carriage	Screw - PT K30x6 Csk Pozi	1	30 cNm
Secure carriage plate to carriage	Screw - PT K30x6 Pan Hd Torx (T10)	1	40 cNm
Secure bearing block to chassis	Screw - Taptite M4x10 Csk Pozi	3	1.0 Nm

Torque guide *(continued)*

Front Case Assembly:

Stage Description	Component Description	Qty	Established Process Torque
Secure syringe sizing retainer	Screw - PT K30x8 Csk Pozi	2	40 cNm
Attach syringe clamp	Screw M3 x 8 Pan Hd Torx (T10)	1	50 cNm
Secure display / mounting brackets to front case	Screw PT K30x12 Csk Pozi	4	50 cNm
Secure syringe flange clamp to chassis / bearing block	Screw - PT K30x14 Pan Hd Torx (T10)	2	70 cNm
Secure chassis to front case	Screw M3x8 Taptite Csk Pozi	1	50 cNm
Secure plunger drive to carriage	Screw - PT K30x6 Pan Hd Torx (T10)	2	30 cNm
Secure RS232 option	Spacer 8mm Hex Br/Ni Pl M3x6mm	4	hand tight
	Nut M3 St. St A2	4	40 cNm
	Screw M3x6 Pan Hd Pozi Z+C	4	40 cNm
Secure Control board	Screw - PT K30x6 Pan Hd Torx (T10)	3	30 cNm
Secure Chassis PCB to chassis	Screw - M3x8 Taptite Pan Hd	2	50 cNm
Secure Models CC & EP pressure transducer assembly to front case	Screw - PT K30x12 Pan Hd Torx (T10)	2	70 cNm

Assembly Rear Case:

Stage Description	Component Description	Qty	Established Process Torque
Attach pole clamp to rear case	Screw - M3x8 Pan Hd Torx (T10)	3	70 cNm
Attach pole clamp arm to pole v clamp	Pivot screw	1	2 Nm
Secure rail clamp to cam	Screw - PT K30x10 Csk Torx (T8) Rogard	1	70 cNm
Attach camera lever	Screw PT K30x8 Pan Hd Torx (T10)	1	60 cNm
Secure mains inlet assy to retainer	Screw - PT K30x12 Csk Torx (T8) Rogard	2	40 cNm
Secure PE stud	M6 Nut	2	hand tight
Secure PSU to case	Screw - PT K30x8 Pan Hd Torx (T10)	3	40 cNm
Secure earth lead to PSU metal frame	Screw M3x6 Pan Hd Pozi	1	hand tight
Fit tube restraint / RS232 cover	Screw PT K30x8 Csk	2	40 cNm
Fit RS232 male / female connectors	Jack Socket RS232 P8000	1	hand tight
Secure Models CC & EP pressure transducer assembly to rear case	Screw - 4gx1/2" S/T B Zn Clr Pz1	1	60 cNm

Final Assembly:

Stage Description	Component Description	Qty	Established Process Torque
Secure front case to rear case	Screw PT K40x12 Pan Hd Torx (T20)	6	70 cNm
Secure battery cover / handle	Screw PT K40x12 Pan Hd Torx (T20)	2	70 cNm

Pressure Transducer Assembly for Models CC & EP only:

Stage Description	Component Description	Qty	Established Process Torque
Secure disk holder centre to top	Screw PT K30x8 Pan Hd Torx (T10)	1	50 cNm
Secure disk holder base to centre	Screw PT K30x8 Pan Hd Torx (T10)	4	50 cNm

Appendix D

Configuration & Drug Protocol Records

In this appendix

Asena GS Syringe Pump Configured Options Record

General Options

Enter the pump-specific information for your records on a copy of this page.

Option	Default		Range	Setting
Software Version	1.5.10 & 2.0.0	1.8.x & 2.2.x		
NURSE CALL FITTED	Disabled	Disabled	Enabled/Disabled	
NURSE CALL INVERT	Disabled	Disabled	Enabled/Disabled	
RS232 SELECTED	Disabled	Disabled	Enabled/Disabled	
NEOI WARNING	1min	5mins	1min - 15mins	
EOI POINT	1.00%	1.00%	0.1% - 5% of syringe volume	
KVO AT EOI	Enabled	Enabled	Enabled/Disabled	
KVO RATE	1.0ml/h	1.0ml/h	0.1ml/h - 2.5ml/h	
BACK OFF		Enabled	Enabled/Disabled	
AUTO SAVE	Enabled	Enabled	Enabled/Disabled	
RATE LOCK	Disabled	Disabled	Enabled/Disabled	
QUIET MODE	Disabled	Disabled	Enabled/Disabled	
AC FAIL	Enabled	Enabled	Enabled/Disabled	
PRESSURE DISPLAY	Disabled	Enabled	Enabled/Disabled	
PRESSURE DEFAULT	L3	L3	L0 - L10(50mmHg -1000mmHg)	
CAP RATE	Max infusion rate	200ml/h	1.0ml/h - 200ml/h	
PURGE RATE	200ml/h	200ml/h	100ml/h - 500ml/h	
PURGE VOLUME LIMIT	2.0ml	2.0ml	0.5ml - 5.0ml	
PURGE SYRINGE		Disabled	Enabled/Disabled	
BOLUS	Enabled	Enabled	Enabled/Disabled	
DEFAULT BOLUS	Max bolus rate	500ml/h	10ml/h - 500ml/h	
CAP BOLUS RATE	Max bolus rate	500ml/h	10ml/h - 500ml/h	
BOLUS VOL LIMIT	5.0ml	5.0ml	0.5ml - 25.0ml	
MANUAL BOLUS		Disabled	Enabled/Disabled	
CALL BACK TIME		2.0mins	0.1mins - 15mins	
EVENT LOG DISPLAY	Disabled	Enabled	Enabled/Disabled	
BATTERY ICON		Enabled	Enabled/Disabled	
AUDIO VOLUME	Medium	Medium	Low, Medium, High	
AUTO NIGHT MODE	Enabled	Enabled	Enabled/Disabled	

Syringes Enabled

Make	Size(s)	Make	Size(s)

Hospital Name ***Serial No.*** ***Software Version***

Approved by ***Configured by***

Date ***Date***

Asena GH Syringe Pump Configured Options Record

General Options

Enter the pump-specific information for your records on a copy of this page.

Option	Default		Range	Setting
Software Version	**1.5.10 & 2.0.0**	**1.8.x & 2.2.x**		
NURSE CALL FITTED	Disabled	Disabled	Enabled/Disabled	
NURSE CALL INVERT	Disabled	Disabled	Enabled/Disabled	
RS232 SELECTED	Disabled	Disabled	Enabled/Disabled	
NEOI WARNING	**1min**	**5mins**	**1min - 15mins**	
EOI POINT	**1%**	**1%**	**0.1% - 5% of syringe volume**	
KVO AT EOI	Enabled	Enabled	Enabled/Disabled	
KVO RATE	1.0ml/h	1.0ml/h	0.1ml/h - 2.5ml/h	
BACK OFF	Disabled	Enabled	Enabled/Disabled	
AUTO SAVE	Enabled	Enabled	Enabled/Disabled	
RATE LOCK	Disabled	Disabled	Enabled/Disabled	
QUIET MODE	Disabled	Disabled	Enabled/Disabled	
AC FAIL	Enabled	Enabled	Enabled/Disabled	
RATE TITRATION	Disabled	Disabled	Enabled/Disabled	
PRESSURE DISPLAY	Disabled	Enabled	Enabled/Disabled	
CAP PRESSURE		L10	L0 - L10(50mmHg -1000mmHg)	
PRESSURE DEFAULT	L3	L3	L0 - L10(50mmHg -1000mmHg)	
CAP RATE	Max infusion rate	1200ml/h	1.0ml/h - 1200ml/h	
PURGE RATE	200ml/h	200ml/h	100ml/h - 500ml/h	
PURGE VOLUME LIMIT	2.0ml	2.0ml	0.5ml - 5.0ml	
PURGE SYRINGE		Disabled	Enabled/Disabled	
BOLUS	Enabled	Enabled	Enabled/Disabled	
DEFAULT BOLUS	Max bolus rate	500ml/h	10ml/h - 500ml/h	
CAP BOLUS RATE	Max bolus rate	1200ml/h	10ml/h - 1200ml/h	
BOLUS VOL LIMIT	5.0ml	5.0ml	0.5ml - 25.0ml	
MANUAL BOLUS		Disabled	Enabled/Disabled	
CALL BACK TIME		2mins	0.1mins - 15mins	
VTBI CLEAR RATE		Disabled	Enabled/Disabled	
EVENT LOG DISPLAY	Disabled	Enabled	Enabled/Disabled	
BATTERY ICON		Enabled	Enabled/Disabled	
AUDIO VOLUME	Medium	Medium	Low, Medium, High	
AUTO NIGHT MODE	Enabled	Enabled	Enabled/Disabled	

Syringes Enabled

Make	Size(s)

Drug Names

1		7	
2		8	
3		9	
4		10	
5		11	
6		12	

Hospital Name ***Serial No.*** ***Software Version***

Approved by ***Configured by***

Date ***Date***

Asena CC Syringe Pump Configured Options Record

General Options Enter the pump-specific information for your records on a copy of this page.

Option	Default		Range	Setting
Software Version	**1.5.10 & 2.0.0**	**1.8.x & 2.2.x**		
NURSE CALL FITTED	Disabled	Disabled	Enabled/Disabled	
NURSE CALL INVERT	Disabled	Disabled	Enabled/Disabled	
RS232 SELECTED	Disabled	Disabled	Enabled/Disabled	
NEOI WARNING	1min	5mins	1min - 15mins	
EOI POINT	1.00%	1.00%	0.1% - 5% of syringe volume	
KVO AT EOI	**Enabled**	**Enabled**	**Enabled/Disabled**	
KVO RATE	**1.0ml/h**	**1.0ml/h**	**0.1ml/h - 2.5ml/h**	
BACK OFF	Disabled	Enabled	Enabled/Disabled	
AUTO SAVE	Enabled	Enabled	Enabled/Disabled	
RATE LOCK	Disabled	Disabled	Enabled/Disabled	
QUIET MODE	Disabled	Disabled	Enabled/Disabled	
AC FAIL	Enabled	Enabled	Enabled/Disabled	
RATE TITRATION	Disabled	Disabled	Enabled/Disabled	
PRESSURE DISPLAY	Disabled	Enabled	Enabled/Disabled	
AUTO PRESSURE	Disabled	Enabled	Enabled/Disabled	
AUTO SET PRESSURE		Disabled	Enabled/Disabled	
AUTO OFFSET		30mmHg	15mmHg - 100mmHg	
PRESSURE DEFAULT	300mmHg	300mmHg	1mmHg - 1000mmHg	
MAX PRESSURE	1000mmHg	1000mmHg	1mmHg - 1000mmHg	
WEIGHT	70Kg	1.00Kg	0.01Kg - 250Kg	
CAP RATE	Max infusion rate	1200ml/h	1.0ml/hr - 1200ml/h	
PURGE RATE	200ml/hr	200ml/h	100ml/hr - 500ml/hr	
PURGE VOLUME LIMIT	2.0ml	2.0ml	0.5ml - 5.0ml	
PURGE SYRINGE		Disabled	Enabled/Disabled	
BOLUS	Enabled	Enabled	Enabled/Disabled	
DEFAULT BOLUS	Max bolus rate	500ml/h	10ml/hr - 1200ml/h	
CAP BOLUS RATE	Max bolus rate	1200ml/h	10ml/hr - 1200ml/h	
BOLUS VOL LIMIT	5.0ml	5.0ml	0.5ml - 25.0ml	
MANUAL BOLUS		Disabled	Enabled/Disabled	
CALL BACK TIME		2.0mins	0.1mins - 15mins	
VTBI CLEAR RATE		Disabled	Enabled/Disabled	
EVENT LOG DISPLAY	Disabled	Enabled	Enabled/Disabled	
BATTERY ICON		Enabled	Enabled/Disabled	
AUDIO VOLUME	Medium	Medium	Low, Medium, High	
AUTO NIGHT MODE	Enabled	Enabled	Enabled/Disabled	

Units Enabled

☐ ng/min,	☐ µg/kg/min,	☐ µg/24h,	☐ mg/kg/min,	☐ mg/24h,	☐ g/24h,	☐ U/h	☐ U/kg/24h,
☐ ng/kg/min	☐ µg/h,	☐ µg/kg/24h	☐ mg/h,	☐ mg/kg/24h,	☐ U/min,	☐ U/kg/h,	☐ kU/24h,
☐ µg/min,	☐ µg/kg/h,	☐ mg/min,	☐ mg/kg/h,	☐ g/h	☐ U/kg/min,	☐ U/24h,	☐ mmol/h

Syringes Enabled

Make	Size(s)	Make	Size(s)

Hospital Name ***Serial No.*** ***Software Version***

Approved by ***Configured by***

Date ***Date***

Asena® TIVA Syringe Pump Configured Options Record

General Options

Enter the pump-specific information for your records on a copy of this page.

Option	Default		Range	Setting
Software Version	**1.6.2 & 2.1.0**	**1.8.x & 2.2.x**		
NURSE CALL FITTED	Disabled	Disabled	Enabled/Disabled	
NURSE CALL INVERT	Disabled	Disabled	Enabled/Disabled	
RS232 SELECTED	Disabled	Disabled	Enabled/Disabled	
NEOI WARNING	1min	5mins	1min - 15mins	
EOI POINT	1.00%	1.00%	0.1% - 5% of syringe volume	
KVO AT EOI	Enabled	Enabled	Enabled/Disabled	
KVO RATE	1.0ml/h	1.0ml/h	0.1ml/h - 2.5ml/h	
BACK OFF	Disabled	Enabled	Enabled/Disabled	
AC FAIL	Enabled	Enabled	Enabled/Disabled	
PRESSURE DISPLAY	Disabled	Enabled	Enabled/Disabled	
PRESSURE DEFAULT	L-5	L-3	L0 - 10(50mmHg -1000mmHg)	
WEIGHT	70.0Kg	70.0Kg	0.01Kg - 250Kg	
PURGE RATE	200ml/h	200ml/h	100ml/h - 500ml/h	
PURGE VOLUME LIMIT	2.0ml	2.0ml	0.5ml - 5.0ml	
PURGE SYRINGE	Enabled	Disabled	Enabled/Disabled	
HANDS FREE BOLUS	Enabled	Enabled	Enabled/Disabled	
DEFAULT BOLUS VOL	5.0ml	5.0ml	0.1ml - 100ml	
DEFAULT BOLUS RATE	1200ml/h	1200ml/h	150ml/h - 1200ml/h	
MANUAL BOLUS		Disabled	Enabled/Disabled	
CALLBACK TIME		2.0mins	0.1mins - 15.0mins	
EVENT LOG DISPLAY	Disabled	Enabled	Enabled/Disabled	
BATTERY ICON		Enabled	Enabled/Disabled	
AUDIO VOLUME	Medium	Medium	Low, Medium, High	
AUTO NIGHT MODE	Enabled	Enabled	Enabled/Disabled	

Syringes Enabled

Make	Size(s)	Make	Size(s)

Hospital Name ***Serial No.*** ***Software Version***

Approved by ***Configured by***

Date ***Date***

Asena® CC Syringe Pump Drug Protocol Setup

Hospital _____ ***Ward/Unit*** _____

No. (1-50*)	Drug Name (12 Chars max*)	Dose Rate				Concentration				Bolus		Pressure Alarm
		Dose Units	Max	Default	Min	Units	Min	Default	Max	Max (ml)	Rate (ml/h)	

Serial Number _____ ***Software Version*** _____

Approved by _____ ***Configured by*** _____

Date _____ ***Date*** _____

* - 100 drug names with a maximum of 17 characters are available for V2.2.x software.

Asena® TIVA Syringe Pump Drug Protocol Setup

Hospital _____ ***Ward/Unit*** _____

No. (1-50*)	Drug Name (12 Chars max*)	Concentration				Dose Rate Units	Induction (dose) (–/Kg)	Time (sec)	Pause after Induction (✓/×)	Maintenance	Bolus		
		Units (–/ml)	Min	Default	Max						Dose (–/Kg)	Rate (ml/h)	Hands Free (✓/×)

Serial Number _____ ***Software Version*** _____

Approved by _____ ***Configured by*** _____

Date _____ ***Date*** _____

* - 100 drug names with a maximum of 17 characters are available for V2.2.x software.

Appendix E

Updates

Updates

Issue	Date	Pages	Description
2	14/01/03	25	RS232 pin-out table pin descriptions pin5 and 9 switched.
		75	Drug Protocol Setup table - Dose Rate Max & Min headings switched.
3	23/04/03	30	Note added on cleaning with reference to shelf keypads.
		69	Added pole clamp pivot screw and changed one screw description.
		64/65	Added pole clamp arm and updated part numbers.
		1	Inserted new logo and issue number
		As Required	Removed stars and changed AsenaTM to Asena®.
		42, 55, 57, 59	Drawings of Pole clamp and Transducer to show latest versions.
4	7/06/04	As Required	Information relating to Guardrails® Safety Software.
		1	New front cover design
		44	Pole clamp arm replacement.
		As Required	Updates for latest Software versions, including - configuration options, part numbers, error codes and new screen display.
		29	Updates and redesign of Performance Verification Procedure.
		49	Enhanced 2 piece syringe flange clamp.
		40-41	Adhesive feet availability information.
		Chapter 6	Added additional diagrams for Chassis and Plunger assembly.
5	27/09/04	11	Administration change.
6	06/04/05	As Required	Add Asena® PK and EP Syringe Pumps
7	20/04/05	20	Add more information regarding battery calibration
		81	Updated TIVA Drug setup & protocol to include more units in column headings
		11	Add access code 612

ALARIS® MEDICAL SYSTEMS | Medication Safety at the Point of Care™

Asena® Syringe Pump Communications Protocol Issue: 3.0

Contents

1 Introduction

1.1 Scope

This document specifies all of the layers of the communications protocol to be used for the range of Asena® Syringe Pump (GS, GH, CC and TIVA models) and, unless otherwise stated, applies to Asena® Syringe Pump software version V1.5.10 (or V1.6.2 for Asena® TIVA Syringe Pumps) and above. Where communication commands are software version specific, then the relevant software version is given in the notes column of the protocol.

1.2 Definitions Of Terms

Client	In this context, the client is expected to be some kind of host computer (e.g. a patient database management system). In some cases, the client may be another Asena® Syringe Pump (e.g. to support the 'Learn' functionality, which enables one syringe pump to configure itself based on the configuration of another 'mentor' syringe pump).
Server	In all cases the server is the Asena® Syringe Pump.
Command	Any message originating from the client that is received by the server.
Response	A message originating from the server, the contents of which correspond to the most recently received command.
Query	A command that is limited in scope to requiring the server to provide requested information.

1.3 Communications Model

The communications model is a point-to-point connection between two communicating parties – a client and a server. The protocol does not make provision for the use of intermediary devices (e.g. routers). Where an intermediate routing mechanism is required, it will need to provide a means of encapsulating the commands and responses associated with this protocol, along with whatever routing and security information is required to ensure the provision of a connection that logically is point-to-point in nature.

As a consequence, this communications protocol does not need to provide support for the following OSI layers:

- Network Layer
- Transport Layer

The communications shall not require connections to be established. Syringe pumps supporting the protocol shall provide access to all of these services at all times. Hence, there is no need to support the following OSI layers either:

- Session Layer
- Presentation Layer

Hence, there is a direct connection between the Application Layer and the Data Link layer.

2 Physical Layer

All communications shall be in the form of asynchronous serial non-return-to-zero data frames, encoded as follows:

- 1 start bit
- 8 data bits
- 1 stop bit
- No parity bits

The protocol has been designed to support the following two types of point to point connection:

- conventional RS232 serial interface
- IrDA infrared physical layer compliant with the latest IrDA Physical Layer specification.

Nothing in the command set is baud rate dependent. However, response times will be slower or faster, depending on whether a lower or higher baud rate is used. Definitions of the mechanisms associated with baud rate selection are outside the scope of this protocol.

In order to facilitate the use of IrDA communications, the link shall be half duplex.

Note: The choice to communicate via either the IrDA port or RS232 serial interface is configurable. When used with the Asena® IDS Docking Station the IrDA communications interface must be enabled.

3 Data Link Layer

The purpose of the Data Link layer is to provide a means by which commands and responses can be packaged in a manner that will enable detection of the corruption of their contents when they are received.

3.1 Frame Structure

Data passed to or from the Data Link layer will be structured as a sequence of ANSI characters arranged as follows:

Start Of Frame Marker	Application Layer Data	Frame Delimiter	Frame Check Sequence	Packet Terminator
1 Exclamation Mark ('!') character	1 to 121 characters from Application Layer ANSI subset	1 Pipe ('|') character	4 hexadecimal characters	1 Carriage Return character (0x0D)

It is expected that detection of an incoming Start Of Frame Marker will result in disposal of all data buffered up to that point, and for buffering of a new packet to start.

3.2 Application Layer Interface

The Data Link layer shall support Application Layer data comprising a sequence of characters from the table below, combined in any manner.

Character Code(s)	Description
20h, 22h to 2Fh, 3Ah to 40h, 5Bh to 60h, 7Bh, 7Dh to 7Eh	Punctuation characters
30h to 39h	Numeric characters
41h to 5Ah, 61h to 7Ah	Alphabetic characters (upper and lower case)
80h to FFh	Special language characters

Application layer data will be passed to and from the Data Link layer in the form of NULL-terminated strings. When the data is incorporated within a Data Link frame, the NULL terminator will be removed.

3.3 Frame Check Sequence

The integrity of Data Link layer packets will be assured using a frame check sequence number generated by a cyclic redundancy check (CRC) mechanism. It will be calculated using the contents of the Application layer data field alone. The CRC will be based on the parameterised Rocksoft Model CRC algorithm [See Section 0 Ref 2] with the following parameters:

Attribute	Value
Name	CRC-CCITT
Width	16 bits
Polynomial	$X^{16} + x^{12} + x^5 + 1$ (0x11021)
Initial Value	0xFFFF
Reflect On Input	FALSE
Reflect On Output	FALSE
XOR Output Width	0x0000
Check	Not applicable

3.4 Premature Termination

At any time when a receiver detects an ESCAPE character (0x1B), all processing of the current sequence of incoming data shall be abandoned and the data discarded. It shall then reset itself to await input of a new string, starting with a Start Of Frame Marker.

At any time when a transmitter needs to cause processing of a packet to be terminated, it shall output a single ESCAPE character.

4 Application Layer

Commands and responses will be encoded into strings of characters from the ANSI subset supported by the Data Link layer. At the interface between the Application and Data Link layers, the strings will be NULL-terminated.

Each string will contain only one command or one response. As can be seen from the command set, a given command or response can contain a number of fields, ensuring that overall data throughput can be optimised.

Note that fields within command or responses are separated using the HL7-compatible caret ('^') delimiter character.

Command and response strings are case-sensitive.

4.1 Command Set

For descriptions of the structure and contents of the fields identified for each command, refer to Section 4.2.

For explanations associated with subscript references, refer to Section 4.6.

Message	Description	Constraints[1]	Message To Server	Response From Server
ALARM MANAGEMENT				
ALARM	Query description of latest alarm.		ALARM	ALARM^<AlarmCode>^<AlarmOrigin>^<AlarmNature>
ALARM_CLEAR	Clear currently active alarm.	Remote control must be enabled	ALARM_CLEAR ^<AlarmCode>	ALARM_CLEAR ^<AlarmCode>
ALARM_SP	Activate / de-activate safety processor alarm.	Remote test must be enabled	ALARM_SP^<ActivationStatus>	ALARM_SP^<ActivationStatus>
AUDIO MANAGEMENT				
AUDIO_QUIET	Query whether or not quiet mode is enabled		AUDIO_QUIET	AUDIO_QUIET^<EnableStatus>
	Specify whether or not quiet mode is enabled	Remote configuration must be enabled	AUDIO_QUIET^<EnableStatus>	AUDIO_QUIET^<EnableStatus>
AUDIO_SPEAKER_TEST	Activate / de-activate speaker test tone.	Remote test must be enabled	AUDIO_SPEAKER_TEST^<ActivationStatus>	AUDIO_SPEAKER_TEST^<ActivationStatus>
AUDIO_VOL	Query current audio volume		AUDIO_VOL	AUDIO_VOL^<AudioVolume>
	Set audio volume	Remote configuration must be enabled	AUDIO_VOL^<AudioVolume>	AUDIO_VOL^<AudioVolume>
COMMUNICATIONS				
COMMS_PROTOCOL	Query the revision level of the communications protocol in		COMMS_PROTOCOL	COMMS_PROTOCOL^<CommsProtocolID>

Message	Description	Constraints[1]	Message To Server	Response From Server
	use.			
COMMS_RESPONSE_MAX	Query maximum syringe pump communications response time.[2]		COMMS_RESPONSE_MAX	COMMS_RESPONSE_MAX^<ResponseTimeValue>^<ResponseTimeUnits>
COMMS_RS232_LOOP_TEST	Perform RS232 loopback test	Remote test must be enabled	COMMS_RS232_LOOP_TEST	COMMS_RS232_LOOP_TEST^<SuccessStatus>
GRAPHICS DISPLAY				
DISPLAY_ILLUM	Query current display illumination		DISPLAY_ILLUM	DISPLAY_ILLUM^<DisplayIlluminationLevel>
	Set display illumination to specified level	Remote configuration must be enabled	DISPLAY_ILLUM^<DisplayIlluminationLevel>	DISPLAY_ILLUM^<DisplayIlluminationLevel>
DISPLAY_TEST	Perform display test	Remote test must be enabled	DISPLAY_TEST	DISPLAY_TEST^<SuccessStatus>
DRUG MANAGEMENT				
DRUG_LIB	Query details of specified drug / Query number of drugs defined.		DRUG_LIB^<DrugNo>	DRUG_LIB^<DrugNo>^<DrugName>^<EnableStatus>^<SelectStatus>^<NumDrugsDefined>
DRUG_LIB_ADD[17]	Add drug to drug library	Remote configuration must be enabled	DRUG_LIB_ADD^<DrugName>	DRUG_LIB_ADD^<DrugName>
DRUG_LIB_BOLUS[18][21]	Query drug bolus configuration of a specified drug.		DRUG_LIB_BOLUS ^<DrugName>	DRUG_LIB_BOLUS^<DrugName^<DrugBolusVolumeLimitValue>^<VolumeUnits>^<DrugBolusRateDfltValue>^<BolusRateUnits>^<HandsFree>
	Configure drug bolus values of a specified drug.	Remote configuration must be enabled	DRUG_LIB_BOLUS^<DrugName^<DrugBolusVolumeLimitValue>^<VolumeUnits>^<DrugBolusRateDfltValue>^<BolusRateUnits>	DRUG_LIB_BOLUS^<DrugName^<DrugBolusVolumeLimitValue>^<VolumeUnits>^<DrugBolusRateDfltValue>^<BolusRateUnits>
DRUG_LIB_CLEARALL	Clear entire drug library	Remote configuration must be enabled	DRUG_LIB_CLEARALL	DRUG_LIB_CLEARALL
DRUG_ LIB_CONC[18]	Query concentration configuration of specified drug.		DRUG_LIB_CONC^<DrugName>	DRUG_LIB_CONC^<DrugName>>^<ConcMinValue>^<ConcDfltValue>^<ConcMaxValue>^<ConcUnits>
	Configure concentration values of specified drug.	Remote configuration must be enabled	DRUG_LIB_CONC^<DrugName>>^<ConcMinValue>^<ConcDfltValue>^<ConcMaxValue>^<ConcUnits>	DRUG_LIB_CONC^<DrugName>^<ConcMinValue>^<ConcDfltValue>^<ConcMaxValue>^<ConcUnits>
DRUG_LIB_DOSE_RATE[18]	Query dose rate configuration of specified drug.	If dose units ml/h	DRUG_LIB_DOSE_RATE^<DrugName>	DRUG_LIB_DOSE_RATE^<DrugName>^<DoseRateUnits>
	Query dose rate configuration of specified drug.		DRUG_LIB_DOSE_RATE^<DrugName>	DRUG_LIB_DOSE_RATE^<DrugName>^<DoseRateMaxValue>^<DoseRateDfltValue>^<DoseRateMinValue>^<DoseRateUnits>

Message	Description	Constraints[1]	Message To Server	Response From Server
	Query dose rate configuration of specified drug.	Remote configuration must be enabled. If dose units ml/h	DRUG_LIB_DOSE_RATE^<DrugName>	DRUG_LIB_DOSE_RATE^<DrugName>^<DoseRateUnits>
	Configure dose rate values for specified drug.	Remote configuration must be enabled.	DRUG_LIB_DOSE_RATE^<DrugName>^<DoseRateMaxValue>^<DoseRateDfltValue>^<DoseRateMinValue>^<DoseRateUnits>	DRUG_LIB_DOSE_RATE^<DrugName>^<DoseRateMaxValue>^<DoseRateDfltValue>^<DoseRateMinValue>^<DoseRateUnits>
DRUG_LIB_ENABLE	Query whether or not specified drug is enabled.		DRUG_LIB_ENABLE^<DrugName>	DRUG_LIB_ENABLE^<DrugName>^<EnableStatus>
	Enable / disable named drug.	Remote configuration must be enabled	DRUG_LIB_ENABLE^<DrugName>^<EnableStatus>	DRUG_LIB_ENABLE^<DrugName>^<EnableStatus>
DRUG_LIB_INDUCTION	Configure an Induction drug (TIVA only)	Applies only to Asena® TIVA Syringe Pump version 1.6.2 and above	DRUG_LIB_INDUCTION^<DrugName>	DRUG_LIB_INDUCTION^<DrugName>^<InductionAmount>^<InductionUnits>^<InductionTime>^<InductionTimeUnits>^<PauseAfterInduction>^<MaintenanceRate>^<MaintenanceRateUnits>
		Remote configuration must be enabled	DRUG_LIB_INDUCTION^<DrugName>^<InductionAmount>^<InductionUnits>^<InductionTime>^<InductionTimeUnits>^<PauseAfterInduction>^<MaintenanceRate>^<MaintenanceRateUnits>	DRUG_LIB_INDUCTION^<DrugName>^<InductionAmount>^<InductionUnits>^<InductionTime>^<InductionTimeUnits>^<PauseAfterInduction>^<MaintenanceRate>^<MaintenanceRateUnits>
DRUG_LIB_NUMDRUGS	Query numbers of drugs defined and enabled in drug library.		DRUG_LIB_NUMDRUGS	DRUG_LIB_NUMDRUGS^<NumDrugsDefined>^<NumDrugsEnabled>
DRUG_LIB_OCCLN_ALARM[18]	Query the occlusion alarm setting of a specified drug.		DRUG_LIB_OCCLN_ALARM^<DrugName>	DRUG_LIB_OCCLN_ALARM^<DrugName>^<DrugOcclusionPressure>^<PressureUnits>
	Configure the occlusion alarm setting of a specified drug, including specification of whether or not the alarm level shall be used.	Remote configuration must be enabled	DRUG_LIB_OCCLN_ALARM^<DrugName>^<DrugOcclusionPressure>^<PressureUnits>	DRUG_LIB_OCCLN_ALARM^<DrugName>^<DrugOcclusionPressure>^<PressureUnits>
DRUG_SELECT[3]	Query current drug selection (name only)		DRUG_SELECT	DRUG_SELECT^<ActivationStatus>^<DrugName>
	Query current drug selection (full protocol)		DRUG_SELECT	DRUG_SELECT^<ActivationStatus>^<DrugName>^<ConcValue>^<ConcUnits>^<DoseRateValue>^<DoseRateUnits>
DRUG_SETUP[19]	Query setup (name only)		DRUG_SETUP	DRUG_SETUP^<ActivationStatus>^<DrugName>
	Query setup (name and dosing)		DRUG_SETUP	DRUG_SETUP^<ActivationStatus>^<DrugName>^<ConcValue>^<ConcUnits>^<DoseRateValue>^<DoseRateUnits>
	Setup drug (name only)	Remote control must be enabled	DRUG_SETUP^<ActivationStatus>^<DrugName>	DRUG_SETUP^<ActivationStatus>^<DrugName>

Message	Description	Constraints[1]	Message To Server	Response From Server
	Setup drug (name and dosing)	Remote control must be enabled	DRUG_SETUP^<ActivationStatus>^<DrugName>^<ConcValue>^<ConcUnits>^<DoseRateValue>^<DoseRateUnits>	DRUG_SETUP^<ActivationStatus>^<DrugName>^<ConcValue>^<ConcUnits>^<DoseRateValue>^<DoseRateUnits>
DRUG_SERVICES	Query the level of drug-related services supported by the syringe pump.		DRUG_SERVICES	DRUG_SERVICES^<DrugServiceLevel>
DRIVE ENGAGEMENT DETECTION				
DRVENG	Query drive engagement status		DRVENG	DRVENG^<DrvEngageStatus>
INFUSION CONTROL & MONITORING				
INF[4]	Query current infusion status Syringe pump serial no. Alarm / Event status Current infusion mode The rate at which fluid is currently being delivered (n.b. not the same as the infusion 'set' rate). Current drug name Volume infused Current line pressure Infusion time remaining ID of latest event log entry.		INF	INF^<InstSerialNo>^<AlarmNotification>^<InfusionMode>^<InfusionRateValue>^<InfusionRateUnits>^<DrugName>^<VI_Value>^<VI_Units>^<PressureValue>^<PressureUnits>^<InfusionTimeRemaining>^<LogType>^<LatestLogEntryID>
INF_BACKOFF	Query whether or not backoff is enabled		INF_BACKOFF	INF_BACKOFF^<EnableStatus>
	Enable / disable backoff	Remote configuration must be enabled	INF_BACKOFF^<EnableStatus>	INF_BACKOFF^<EnableStatus>
INF_BOLUS	Query if bolus is enabled or disabled. *See note 21 for TIVA information.*		INF_BOLUS	INF_BOLUS^<EnableStatus>
	Specify whether bolus is or is not enabled	Remote configuration must be enabled	INF_BOLUS^<EnableStatus>	INF_BOLUS^<EnableStatus>
INF_BOLUS_CAP_RATE	Query bolus cap rate		INF_BOLUS_CAP_RATE	INF_BOLUS_CAP_RATE^<BolusRateValue>^<BolusRateUnits>
	Set bolus cap rate	Remote configuration	INF_BOLUS_CAP_RATE^<BolusRateValue>^<B	INF_BOLUS_CAP_RATE^<BolusRateValue>^<B

Message	Description	Constraints[1]	Message To Server	Response From Server
		must be enabled	olusRateUnits>	olusRateUnits>
INF_BOLUS_DEF_RATE	Query default bolus rate		INF_BOLUS_DEF_RATE	INF_BOLUS_DEF_RATE^<BolusRateValue>^<BolusRateUnits>
	Set default bolus rate	Remote configuration must be enabled	INF_BOLUS_DEF_RATE^<BolusRateValue>^<BolusRateUnits>	INF_BOLUS_DEF_RATE^<BolusRateValue>^<BolusRateUnits>
INF_BOLUS_VOL_LIMIT	Query bolus volume limit		INF_BOLUS_VOL_LIMIT	INF_BOLUS_VOL_LIMIT^<BolusVolumeLimitValue >^<VolumeUnits>
	Set bolus volume limit	Remote configuration must be enabled	INF_BOLUS_VOL_LIMIT^<BolusVolumeLimitValue>^<VolumeUnits>	INF_BOLUS_VOL_LIMIT^<BolusVolumeLimitValue >^<VolumeUnits>
INF_CAP_RATE	Query infusion cap rate		INF_CAP_RATE	INF_CAP_RATE^<InfusionRateValue>^<InfusionRateUnits>
	Set infusion cap rate	Remote configuration must be enabled	INF_CAP_RATE^<InfusionRateValue>^<InfusionRateUnits>	INF_CAP_RATE^<InfusionRateValue>^<InfusionRateUnits>
INF_HANDSFREE	Query whether Handsfree is enabled or not	Applies only to software versions 1.8.1, 2.2.0 and above	INF_HANDSFREE	INF_HANDSFREE^<EnableStatus>
	Set Handsfree	Remote configuration must be enabled	INF_HANDSFREE^<EnableStatus>	INF_HANDSFREE^<EnableStatus>
INF_INDUCTION	Query current Induction Status Activation Status Induction Volume Volume Units Induction Rate Induction Rate Units Pause After Induction Maintenance Rate Maintenance Rate Units	Applies only to Asena® TIVA Syringe Pump version 1.6.2 and above	INF_INDUCTION	INF_INDUCTION^<Enable Status>^<Induction Value>^<Induction Volume Units>^<Induction Rate>^<Induction Rate Units>^<Pause After Induction>^<Maintenance Rate>^<Maintenance Rate Units>
	Set Induction parameters	Remote control must be enabled	INF_INDUCTION^<Enable Status>^<Induction Value>^<Induction Volume Units>^<Induction Rate>^<Induction Rate Units>^<Pause After Induction>^<Maintenance Rate>^<Maintenance Rate Units>	INF_INDUCTION^<Enable Status>^<Induction Value>^<Induction Volume Units>^<Induction Rate>^<Induction Rate Units>^<Pause After Induction>^<Maintenance Rate>^<Maintenance Rate Units>
INF_KVO	Query whether or not KVO delivery is enabled		INF_KVO	INF_KVO^<EnableStatus>
	Enable / disable KVO delivery	Remote configuration must be enabled	INF_KVO^<EnableStatus>	INF_KVO^<EnableStatus>
INF_KVO_RATE	Query KVO rate		INF_KVO_RATE	INF_KVO_RATE^<InfusionRateValue>^<Infusion

Message	Description	Constraints[1]	Message To Server	Response From Server
				RateUnits>
	Set KVO rate	Remote configuration must be enabled	INF_KVO_RATE^<InfusionRateValue>^<Infusion RateUnits>	INF_KVO_RATE^<InfusionRateValue>^<Infusion RateUnits>
INF_MANUALBOLUS	Query whether Manual Bolus is enabled or not	Applies only to software versions 1.8.1, 2.2.0 and above	INF_MANUALBOLUS	INF_ MANUALBOLUS ^<EnableStatus>
	Set Handsfree	Remote configuration must be enabled	INF_ MANUALBOLUS ^<EnableStatus>	INF_ MANUALBOLUS ^<EnableStatus>
INF_PURGE_PRIME_SYRINGE	Query whether or not syringe/set priming is enabled	Applies only to software versions 1.8.1, 2.2.0 and above	INF_PURGE_PRIME_SYRINGE	INF_PURGE_PRIME_SYRINGE
	Set purge rate	Remote configuration must be enabled	INF_PURGE_PRIME_SYRINGE^<EnableStatus>	INF_PURGE_PRIME_SYRINGE^<EnableStatus>
INF_PURGE_RATE	Query purge rate		INF_PURGE_ RATE	INF_PURGE_RATE^<PurgeRateValue>^<Purge RateUnits>
	Set purge rate	Remote configuration must be enabled	INF_PURGE_RATE^<PurgeRateValue>^<Purge RateUnits>	INF_PURGE_RATE^<PurgeRateValue>^<Purge RateUnits>
INF_PURGE_VOL_LIMIT	Query purge volume limit		INF^PURGE_VOL_LIMIT	INF_PURGE_VOL_LIMIT^<VolumeValue>^<Vol umeUnits>
	Set purge volume limit	Remote configuration must be enabled	INF_PURGE_VOL_LIMIT^<VolumeValue>^<Vol umeUnits>	INF_PURGE_VOL_LIMIT^<VolumeValue>^<Vol umeUnits>
INF_RATE	Query infusion rate		INF_RATE	INF_RATE^<InfusionRateValue>^<InfusionRate Units>
	Set infusion rate[5]	Remote control must be enabled	INF_RATE^<InfusionRateValue>^<InfusionRate Units>	INF_RATE^<InfusionRateValue>^<InfusionRate Units>
INF_RATE_ACHIEVABLE	Query whether set infusion rate is achievable		INF_RATE_ACHIEVABLE	INF_RATE_ACHIEVABLE^<SuccessStatus>
INF_RATE_MAX_SYRINGE	Query maximum infusion rate that is permitted for the currently confirmed syringe. Note that this rate may be higher than the syringe pump itself can support.		INF_RATE_MAX_SYRINGE	INF_RATE_MAX_SYRINGE^<InfusionRateValue >^<InfusionRateUnits>
INF_START[6]	Start infusion	Remote control must be enabled	INF_START	INF_START
INF_STOP	Stop infusion	Remote control must be enabled	INF_STOP	INF_STOP
INF_TITRATE	Query whether or not titration is enabled		INF_TITRATE	INF_TITRATE^<EnableStatus>

Message	Description	Constraints[1]	Message To Server	Response From Server
	Enable / disable titration	Remote configuration must be enabled	INF_TITRATE^<EnableStatus>	INF_TITRATE^<EnableStatus>
INF_VI	Query volume infused		INF_VI	INF_VI^<VI_Value>^<VI_Units>
INF_VI_CLEAR	Clear volume infused[7]	Remote control must be enabled	INF_VI_CLEAR	INF_VI_CLEAR
INF_VI_CLEAR_CTRL	Enable / disable VI clearing from syringe pump keypad.[7]	Remote control must be enabled	INF_VI_CLEAR_CTRL^<EnableStatus>	INF_VI_CLEAR_CTRL^<EnableStatus>
	Query VI clear status		INF_VI_CLEAR_CTRL	INF_VI_CLEAR_CTRL^<EnableStatus>
INF_VTBI	Query volume remaining to be infused		INF_VTBI	INF_VTBI^<ActivationStatus>^<VolumeValue>^<VolumeUnits>^<VTBI_EndAction>
	De-activate VTBI	Remote control must be enabled	INF_VTBI^<ActivationStatus>	INF_VTBI^<ActivationStatus>^^^
	Set volume to be infused	Remote control must be enabled	INF_VTBI^<ActivationStatus>^<VolumeValue>^<VolumeUnits>^<VTBI_EndAction>	INF_VTBI^<ActivationStatus>^<VolumeValue>^<VolumeUnits>^<VTBI_EndAction>
INF_VTBI_CLEAR	Query whether or not VTBI is to be cleared after infusion	Applies only to software versions 1.8.1, 2.2.0 and above	INF_VTBI_CLEAR	INF_VTBI_CLEAR<ActivationStatus>
	Set VTBI Clear.	Remote control must be enabled	INF_VTBI_CLEAR<ActivationStatus>	INF_VTBI_CLEAR<ActivationStatus>
SYRINGE PUMP MANAGEMENT				
INST_DEDICATE	Query dedication setting		INST_DEDICATE	INST_DEDICATE^<DedicationSetting>
		Remote configuration must be enabled	INST_DEDICATE^<DedicationSetting>	INST_DEDICATE^<DedicationSetting>
INST_HOSPNAME	Query hospital name		INST_HOSPNAME	INST_HOSPNAME^<HospitalName>
	Set hospital name	Remote configuration must be enabled	INST_HOSPNAME^<HospitalName>	INST_HOSPNAME^<HospitalName>
INST_MANUFACTURER	Query name of manufacturer		INST_MANUFACTURER	INST_MANUFACTURER^<ManufacturerName>
INST_NAME	Query the name of the syringe pump		INST_NAME	INST_NAME^<InstModelIdentifier>
INST_SERIALNO	Query syringe pump serial number		INST_SERIALNO	INST_SERIALNO^<InstSerialNo>
	Set syringe pump serial number	Remote configuration must be enabled	INST_SERIALNO^<InstSerialNo>	INST_SERIALNO^<InstSerialNo>
INST_SERVICE_DATE	Query service date		INST_SERVICE_DATE	INST_SERVICE_DATE^<ServiceDate>
	Set service date	Remote configuration must be enabled	INST_SERVICE_DATE^<ServiceDate>	INST_SERVICE_DATE^<ServiceDate>

Message	Description	Constraints[1]	Message To Server	Response From Server
INST_SERVICE_MESSAGE	Query service message		INST_SERVICE_MESSAGE	INST_SERVICE_MESSAGE^<ServiceMessage>
	Set service message	Remote configuration must be enabled	INST_SERVICE_MESSAGE^<ServiceMessage>	INST_SERVICE_MESSAGE^<ServiceMessage>
INST_SWVER	Query main processor software version of specified programmable component		INST_SWVER^<ProgComponentID>	INST_SWVER^<ProgComponentID>^<VersionID>
INST_UNITREF	Query unit reference		INST_UNITREF	INST_UNITREF^<UnitReference>
	Set unit reference	Remote configuration must be enabled	INST_UNITREF^<UnitReference>	INST_UNITREF^<UnitReference>
INST_USAGE	Query usage		INST_USAGE	INST_USAGE^<UsageSinceColdStartValue>^<UsageSinceUseMonResetValue>^<UsageUnits>
KEYPAD				
KEY	Query status of specified key		KEY^<KeyName>	KEY^<KeyName>^<PressStatus>
LOGGING[8]				
LOG_NUM_RECORDS	Query number of logged records.		LOG_NUM_RECORDS^<LogType>	LOG_NUM_RECORDS^<LogType>^<MaxNumLoggedRecords>^<NumLoggedRecords>^<LatestLogEntryID>
LOG_READ	Read specified logging record.		LOG_READ^<LogType>^<LogEntryID>	LOG_READ^<LogType>^<LogEntryID>^<LogEntryMnemonic>^<LogTimeStamp>^<LogEntryDescription>
LOG_USER_ACCESS	Query whether or not user access is enabled		LOG_USER_ACCESS^<LogType>	LOG_USER_ACCESS^<LogType>^<EnableStatus>
	Specify whether or not user access is enabled	Remote configuration must be enabled	LOG_USER_ACCESS^<LogType>^<EnableStatus>	LOG_USER_ACCESS^<LogType>^<EnableStatus>
MOTOR				
MOTOR_TEST_STATUS	Query current state of test[9]		MOTOR_TEST_STATUS	MOTOR_TEST_STATUS^<MotorTestStatus>
NURSE CALL				
NURSE_MODFIT	Query whether or not module is fitted		NURSE_MODFIT	NURSE_MODFIT^<FitStatus>
	Specify whether or not module is fitted	Remote configuration must be enabled	NURSE_MODFIT^<FitStatus>	NURSE_MODFIT^<FitStatus>
NURSE_RELAY_MODE	Query relay operating mode		NURSE_RELAY_MODE	NURSE_RELAY_MODE^<NurseCallMode>
	Specify relay operating mode	Remote configuration must be enabled	NURSE_RELAY_MODE^<NurseCallMode>	NURSE_RELAY_MODE^<NurseCallMode>

Message	Description	Constraints[1]	Message To Server	Response From Server
NURSE_ STATUS	Query nurse call status		NURSE_ STATUS	NURSE_ STATUS^<ActivationStatus>
	Specify required state of nurse call	Remote test must be enabled	NURSE_STATUS^<ActivationStatus>	NURSE_ STATUS^<ActivationStatus>
PATIENT MANAGEMENT				
PATIENT_SERVICES	Query patient related services supported by syringe pump in use.		PATIENT_SERVICES	PATIENT_SERVICES^<PatientServiceLevel>
PATIENT_WEIGHT[20]	Query patient weight		PATIENT_WEIGHT	PATIENT_WEIGHT^<WeightValue>^<WeightUnits>
	Set patient weight	Remote control must be enabled	PATIENT_WEIGHT^<WeightValue>^<WeightUnits>	PATIENT_WEIGHT^<WeightValue>^<WeightUnits>
PATIENT_WEIGHT_DFLT	Query default patient weight		PATIENT_WEIGHT_DFLT	PATIENT_WEIGHT_DFLT^<WeightValue>^<WeightUnits>
	Set default patient weight	Remote configuration must be enabled	PATIENT_WEIGHT_DFLT^<WeightValue>^<WeightUnits>	PATIENT_WEIGHT_DFLT^<WeightValue>^<WeightUnits>
PLUNGER DRIVE				
PLNGRDRV_EOI	Query end of infusion point		PLNGRDRV_EOI	PLNGRDRV_EOI^<ProportionValue>^<ProportionUnits>
	Set end of infusion point	Remote configuration must be enabled	PLNGRDRV_EOI^<ProportionValue>^<ProportionUnits>	PLNGRDRV_EOI^<ProportionValue>^<ProportionUnits>
PLNGRDRV_NEOI	Query near end of infusion point		PLNGRDRV_NEOI	PLNGRDRV_NEOI^<TimeValue>^<TimeUnits>
	Set near end of infusion point	Remote configuration must be enabled	PLNGRDRV_NEOI^<TimeValue>^<TimeUnits>	PLNGRDRV_ NEOI^<TimeValue>^<TimeUnits>
PLNGRDRV_PLNGRPOSN	Query current plunger position reading		PLNGRDRV_PLNGRPOSN	PLNGRDRV_PLNGRPOSN^<PlngrPosnValue>^<PlngrPosnUnits>^<SensorVoltageValue>^<SensorVoltageUnits>
PLNGRDRV_PLNGRPOSN _CALPT	Query plunger position sensor calibration value		PLNGRDRV_PLNGRPOSN _CALPT^<CalPtNo>	PLNGRDRV_PLNGRPOSN_CALPT^<CalPtNo>^CalNumPts>^<CalStatus>^<PlngrPosnValue>^<PlngrPosnUnits>^<SensorVoltageValue>^<SensorVoltageUnits>
POWER SUPPLY				
POWER_BAT_CAP	Query battery capacity		POWER_BAT_CAP	POWER_BAT_CAP^<BatChargeValue>^<BatChargeUnits>
POWER_BAT_CHR	Query state of battery charge		POWER_BAT_CHR	POWER_BAT_CHR^<BatChargeValue>^<BatChargeUnits>
POWER_BAT_VDQ	Query whether current		POWER_BAT_VDQ	POWER_BAT_VDQ^<SuccessStatus>

Message	Description	Constraints[1]	Message To Server	Response From Server
	discharge is valid (i.e. will result in battery capacity being re-evaluated when discharge complete)			
POWER_BAT_VOL	Query current battery voltage		POWER_BAT_VOL	POWER_BAT_VOL^<VoltageValue>^<VoltageUnits>
POWER_MAINS	Query status of AC mains supply		POWER_MAINS	POWER_MAINS^<MainsStatus>
POWER_MAINS_ALARM	Query whether mains failure alarm is enabled		POWER_MAINS_ALARM	POWER_MAINS_ALARM^<EnableStatus>
	Specify whether mains failure alarm is enabled	Remote configuration must be enabled	POWER_MAINS_ALARM^<EnableStatus>	POWER_MAINS_ALARM^<EnableStatus>
PRESSURE MONITORING				
PRESSURE	Query current pressure (based on whichever sensor reading is currently being used)		PRESSURE	PRESSURE^<PressureLevel>^<PressureValue>^<PressureUnits>
PRESSURE_AUTO_OFFSET	Query current Auto Pressure setting		PRESSURE_AUTO_OFFSET	PRESSURE_AUTO_OFFSET^<PressureValue>^<PressureUnits>
	Set Auto Pressure level	Remote configuration must be enabled	PRESSURE_AUTO_OFFSET^<PressureValue>^<PressureUnits>	PRESSURE_AUTO_OFFSET^<PressureValue>^<PressureUnits>
PRESSURE_AUTO_SET	Query whether Auto Set is enabled or disabled	Applies only to software versions 1.8.1, 2.2.0 and above	PRESSURE_AUTO_SET	PRESSURE_AUTO_SET^<EnableStatus>
		Remote configuration must be enabled	PRESSURE_AUTO_SET^<EnableStatus>	PRESSURE_AUTO_SET^<EnableStatus>
PRESSURE_DISC	Query current line pressure reading and disc fitment status		PRESSURE_DISC	PRESSURE_DISC^<FitStatus>^<PressureValue>^<PressureUnits>^<SensorVoltageValue>^<SensorOffsetVoltageValue>^<SensorVoltageUnits>^<SensorCurrentValue>^<SensorCurrentUnits>
PRESSURE_DISC_CALPT	Query line pressure sensor calibration value		PRESSURE_DISC_CALPT^<CalPtNo>	PRESSURE_DISC_CALPT^<CalPtNo>^<CalNumPts>^<CalStatus>^<PressureValue>^<PressureUnits>^<SensorVoltageValue>^<SensorVoltageUnits>
PRESSURE_DISPLAY	Query whether pressure display is or is not enabled		PRESSURE_DISPLAY	PRESSURE_DISPLAY^<EnableStatus>
	Enable / disable pressure display	Remote configuration must be enabled	PRESSURE_DISPLAY^<EnableStatus>	PRESSURE_DISPLAY^<EnableStatus>
PRESSURE_LEVEL_CAP	Query the pressure level cap setting (GH only)	Applies only to software versions	PRESSURE_LEVEL_CAP	PRESSURE_LEVEL_CAP^<PressureLevel>

Message	Description	Constraints[1]	Message To Server	Response From Server
		1.8.1, 2.2.0 and above		
	Set pressure cap level.	Remote configuration must be enabled	PRESSURE_LEVEL_CAP^<PressureLevel>	PRESSURE_LEVEL_CAP^<PressureLevel>
PRESSURE_LINE_DISCONNECT	Query whether line disconnection alarm is or is not enabled		PRESSURE_LINE_DISCONNECT	PRESSURE_LINE_DISCONNECT^<EnableStatus>
	Enable / disable line disconnection alarm	Remote configuration must be enabled	PRESSURE_LINE_DISCONNECT^<EnableStatus>	PRESSURE_LINE_DISCONNECT^<EnableStatus>
PRESSURE_OAL	Query occlusion alarm level setting		PRESSURE_OAL	PRESSURE_OAL^<PressureLevel>^<PressureValue>^<PressureUnits>
	Set occlusion alarm level – using pressure level	Remote control must be enabled	PRESSURE_OAL^<PressureLevel>	PRESSURE_OAL^<PressureLevel>^<PressureValue>^<PressureUnits>
	Set occlusion alarm level – using pressure value	Remote control must be enabled	PRESSURE_OAL^^<PressureValue>^<PressureUnits>	PRESSURE_OAL^<PressureLevel>^<PressureValue>^<PressureUnits>
PRESSURE_OAL_AUTO	Query whether auto pressure setting is or is not enabled		PRESSURE_OAL_AUTO	PRESSURE_OAL_AUTO^<EnableStatus>
	Enable / disable auto pressure setting	Remote configuration must be enabled	PRESSURE_OAL_AUTO^<EnableStatus>	PRESSURE_OAL_AUTO^<EnableStatus>
PRESSURE_OAL_DFLT[15]	Query default occlusion alarm level – no pressure sensor fitted		PRESSURE_OAL_DFLT	PRESSURE_OAL_DFLT^<PressureLevel>^<PressureValue>^<PressureUnits>
	Query default occlusion alarm level – pressure sensor fitted		PRESSURE_OAL_DFLT	PRESSURE_OAL_DFLT^^<PressureValue>^<PressureUnits>
	Set default occlusion alarm level – using pressure level – no pressure sensor fitted	Remote configuration must be enabled	PRESSURE_OAL_DFLT^<PressureLevel>	PRESSURE_OAL_DFLT^<PressureLevel>^<PressureValue>^<PressureUnits>
	Set default occlusion alarm level – using pressure level – pressure sensor fitted	Remote configuration must be enabled	PRESSURE_OAL_DFLT^^<PressureValue>^<PressureUnits>	PRESSURE_OAL_DFLT^^<PressureValue>^<PressureUnits>
PRESSURE_OAL_MAX[15,16]	Query maximum occlusion alarm level		PRESSURE_OAL_MAX	PRESSURE_OAL_MAX^<PressureLevel>^<PressureValue>^<PressureUnits>
	Set maximum occlusion alarm level – using pressure level	Remote configuration must be enabled	PRESSURE_OAL_MAX^<PressureLevel>	PRESSURE_OAL_MAX^<PressureLevel>^<PressureValue>^<PressureUnits>
REMOTE MODES[10]				
REMOTE_CFG[11]	Query remote configuration status and reversion timeout.		REMOTE_CFG	REMOTE_CFG^<EnableStatus>^<PermitStatus>
	Disable remote configuration		REMOTE_CFG^<EnableStatus>	REMOTE_CFG^<EnableStatus>^<CommsSecurityCode> ^<PermitStatus>

Message	Description	Constraints[1]	Message To Server	Response From Server
	Enable remote configuration		REMOTE_CFG^<EnableStatus>^<CommsSecurityCode>	REMOTE_CFG^<EnableStatus>^<CommsSecurityCode> ^<PermitStatus>
REMOTE_CTRL[11]	Query remote control status and reversion timeout.		REMOTE_CTRL	REMOTE_CTRL^<EnableStatus>^<PermitStatus>^<TimeoutValue>^<TimeoutUnits>
	Disable remote control		REMOTE_CTRL^<EnableStatus>	REMOTE_CTRL^<EnableStatus>^<CommsSecurityCode>^<PermitStatus>^<TimeoutValue>^<TimeoutUnits>
	Enable remote control		REMOTE_CTRL^<EnableStatus>^<CommsSecurityCode>	REMOTE_CTRL^<EnableStatus>^<CommsSecurityCode>^<PermitStatus>^<TimeoutValue>^<TimeoutUnits>
REMOTE_TEST	Query remote test status.		REMOTE_TEST	REMOTE_TEST^<EnableStatus>
REMOTE QUERY[12]				
REMQUERY	Query activation status of remote query.		REMQUERY	REMQUERY^<ActivationStatus>^<RemQueryDescPtA>^<RemQueryDescPtB>^<RemQueryOptionA>^<RemQueryOptionB>
	De-activate a remote query	Remote control must be enabled	REMQUERY^<ActivationStatus>	REMQUERY^<ActivationStatus>^<RemQueryDescPtA>^<RemQueryDescPtB>^<RemQueryOptionA>^<RemQueryOptionB>
	Activate a remote query	Remote control must be enabled	REMQUERY^<ActivationStatus>^<RemQueryDescPtA>^<RemQueryDescPtB>^<RemQueryOptionA>^<RemQueryOptionB>	REMQUERY^<ActivationStatus>^<RemQueryDescPtA>^<RemQueryDescPtB>^<RemQueryOptionA>^<RemQueryOptionB>
REMQUERY_RESULT	Query remote query result		REMQUERY_RESULT	REMQUERY_RESULT^<AvailabilityStatus>^<RemQueryResult>
REAL TIME CLOCK				
RTC	Query current real time clock value		RTC	RTC^<RTC_DateAndTime>
	Set real time clock	Remote configuration must be enabled	RTC^<RTC_DateAndTime>	RTC^<RTC_DateAndTime>
SYRINGE FORCE MEASUREMENT				
SYRFORCE	Query current syringe force reading		SYRFORCE	SYRFORCE^<ForceValue>^<ForceUnits>^<SensorVoltageValue>^<SensorOffsetVoltageValue>^<SensorVoltageUnits>^<SensorCurrentValue>^<SensorCurrentUnits>
SYRFORCE_CALPT	Query syringe force sensor calibration value		SYRFORCE_CALPT^<CalPtNo>	SYRFORCE_CALPT^<CalPtNo>^<CalNumPts>^<CalStatus>^<ForceValue>^<ForceUnits>^<SensorVoltageValue>^<SensorVoltageUnits>

Message	Description	Constraints[1]	Message To Server	Response From Server
SYRINGE MANAGEMENT				
SYRINGE_BRAND	Query whether or not specified brand of syringe is enabled and selected.		SYRINGE_BRAND^<SyrBrand>	SYRINGE_BRAND^<SyrBrand>^<EnableStatus>^<SelectStatus>
	Disable specified brand of syringe OR Enable specified brand of syringe without selecting it.	Remote configuration must be enabled	SYRINGE_BRAND^<SyrBrand>^<EnableStatus>	SYRINGE_BRAND^<SyrBrand>^<EnableStatus>
	Enable and select specified brand of syringe.	Remote configuration must be enabled	SYRINGE_BRAND^<SyrBrand>^<EnableStatus>^<SelectStatus>	SYRINGE_BRAND^<SyrBrand>^<EnableStatus>^<SelectStatus>
SYRINGE_BRAND_NAME	Query name of specified brand and number of brand available		SYRINGE_BRAND_NAME^<SyrBrandNo>	SYRINGE_BRAND_NAME^<SyrBrandNo>^<SyrBrand>^<SyrNumBrands>
SYRINGE_CLAMP	Query syringe clamp diameter reading		SYRINGE_CLAMP	SYRINGE_CLAMP^<DiamValue>^<DiamUnits>^<AngleValue>^<AngleUnits>^<SensorVoltageValue>^<SensorVoltageUnits>
SYRINGE_CLAMP_CALPT	Query syringe clamp sensor calibration value		SYRINGE_CLAMP_CALPT^<CalPtNo>	SYRINGE_CLAMP_CALPT^<CalPtNo>^<CalNumPts>^<CalStatus>^<DiamValue>^<DiamUnits>^<SensorVoltageValue>^<SensorVoltageUnits>
SYRINGE_CONFIRM[13]	Query whether or not syringe is confirmed		SYRINGE_CONFIRM	SYRINGE_CONFIRM^<SyrConfirmStatus>
	Confirm syringe	Remote control must be enabled	SYRINGE_CONFIRM^<SyrConfirmStatus>	SYRINGE_CONFIRM^<SyrConfirmStatus>
SYRINGE_CONFIRMABLE	Query whether or not syringe can be confirmed.		SYRINGE_CONFIRMABLE	SYRINGE_CONFIRMABLE^<SyrConfirmStatus>
SYRINGE_COVER[14]	Query whether or not syringe cover is closed.		SYRINGE_COVER	SYRINGE_COVER^<ClosureStatus>
SYRINGE_COVER_FIT	Query whether or not cover is fitted		SYRINGE_COVER_FIT	SYRINGE_COVER_FIT^<FitStatus>
	Specify whether or not cover is fitted	Remote configuration must be enabled	SYRINGE_COVER_FIT^<FitStatus>	SYRINGE_COVER_FIT^<FitStatus>
SYRINGE_MODEL	Query whether or not specified model of syringe is enabled.		SYRINGE_MODEL^<SyrBrand>^<SyrModel>	SYRINGE_MODEL^<SyrBrand>^<SyrModel>^<EnableStatus>
	Enable / disable and select / de-select specified model of syringe.	Remote configuration must be enabled	SYRINGE_MODEL^<SyrBrand>^<SyrModel>^<EnableStatus>	SYRINGE_MODEL^<SyrBrand>^<SyrModel>^<EnableStatus>
SYRINGE_MODEL_NAME	Query name of model within specified brand and number		SYRINGE_MODEL_NAME^<SyrBrand>^<SyrModelNo>	SYRINGE_MODEL_NAME^<SyrBrand>^<SyrModelNo>^<SyrModel>^<SyrNumModels>

Message	Description	Constraints[1]	Message To Server	Response From Server
	of models available within that brand.			
SYRINGE_PLNGRFIT	Query syringe plunger fitment status		SYRINGE_PLNGRFIT	SYRINGE_PLNGRFIT^<FitStatus>
SYRINGE_RECOGNISED	Query whether or not syringe is recognised		SYRINGE_RECOGNISED	SYRINGE_RECOGNISED^<SyrRecognitionStatus>
SYRINGE_STATUS	Query status of syringe		SYRINGE_STATUS	SYRINGE_STATUS^<SyrBrand>^<SyrModel>^<SyrConfirmStatus>
USER INTERFACE				
UI_AUTONIGHT	Query if auto night mode is enabled		UI_AUTONIGHT	UI_AUTONIGHT^<EnableStatus>
	Specify whether or not auto night mode is enabled	Remote configuration must be enabled	UI_AUTONIGHT^<EnableStatus>	UI_AUTONIGHT^<EnableStatus>
UI_AUTOSAVE	Query if autosave is enabled		UI_AUTOSAVE	UI_AUTOSAVE^<EnableStatus>
	Specify whether or not autosave is enabled	Remote configuration must be enabled	UI_AUTOSAVE^<EnableStatus>	UI_AUTOSAVE^<EnableStatus>
UI_BATTERY_ICON	Query if Battery icon is enabled	Applies only to software versions 1.8.1, 2.2.0 and above	UI_BATTERY_ICON	UI_BATTERY_ICON^<EnabledStatus>
	Specify whether or not battery icon is enabled	Remote configuration must be enabled	UI_BATTERY_ICON^<EnabledStatus>	UI_BATTERY_ICON^<EnabledStatus>
UI_CALLBACK_TIME	Query current callback time	Applies only to software versions 1.8.1, 2.2.0 and above	UI_CALLBACK_TIME	UI_CALLBACK_TIME^<Time>^<Units>
	Specify callback time	Remote configuration must be enabled	UI_CALLBACK_TIME^<Time>^<Units>	UI_CALLBACK_TIME^<Time>^<Units>
UI_LANG	Query current language		UI_LANG	UI_LANG^<LanguageCode>
	Set language	Remote configuration must be enabled	UI_LANG^<LanguageCode>	UI_LANG^<LanguageCode>
UI_RATELOCK	Query if ratelock is enabled		UI_RATELOCK	UI_RATELOCK^<EnableStatus>
	Specify whether or not ratelock is enabled	Remote configuration must be enabled	UI_RATELOCK^<EnableStatus>	UI_RATELOCK^<EnableStatus>
UI_VANILLA	Query if vanilla operation is enabled		UI_VANILLA	UI_VANILLA^<EnableStatus>
	Specify whether or not vanilla operation is enabled	Remote configuration must be enabled	UI_VANILLA^<EnableStatus>	UI_VANILLA^<EnableStatus>
VISUAL STATUS				

Message	Description	Constraints[1]	Message To Server	Response From Server
INDICATORS				
VSI	Set specified VSI to specified state	Remote test must be enabled	VSI^<VSI_Name>^<VSI_State>	VSI^<VSI_Name>^<VSI_State>

4.2 Field Structure

Parameter	Description Of Contents	Format		Max Width
ALARMS				
<AlarmCode>	Identifies the nature of an alarm in a language-independent manner.	See Alarm Mnemonic table		10
<AlarmNature>	A description of the nature of an alarm.	Character sequence in local language		30
<AlarmNotification>	This code enables rapid reporting that something significant has happened to or within the syringe pump, i.e. sufficient to warrant further interrogation.	Mnemonic encoded as follows:		1
		A	Syringe pump alarming	
		-	Syringe pump not alarming	
<AlarmOrigin>	A description of the origin of the alarm.	Character sequence in local language		30
AUDIO MANAGEMENT				
<AudioVolume>	Specifies an audio volume level.	Mnemonic encoded as follows:		4
		LOW	Low volume level	
		MED	Medium volume level	
		HIGH	High volume level	
CALIBRATION				
<CalNumPts>	The number of points in a given calibration procedure.	Character sequence representing positive integer		3
<CalPtNo>	A number that uniquely identifies a calibration point within a series of calibration points, where, for the calibration series: 0 <= <CalPtNo> < <CalNumPts>	Character sequence representing positive integer		3
<CalStatus>	Specifies whether or not calibration is valid.	Mnemonic encoded as follows:		8
		VALID	Calibration valid	
		NOTVALID	Calibration not valid	
COMMUNICATIONS				
<CommsProtocolID>	Specifies the revision identifier of the communications protocol that is supported by the syringe pump.	Character sequence – valid values being:		20

Parameter	Description Of Contents	Format		Max Width
		- "Asena Rev x.x.x"		
<CommsSecurityCode>[14]	A character sequence containing a code that is used as a protection mechanism.	Character sequence		4
DATE AND TIME				
<RTC_DateAndTime>	Specifies a date and time retrieved from or used to set a clock.	IEC8601 DateAndTimeStamp		19
DEDICATION SUPPORT				
<DedicationSetting>	Specifies a dedication setting.	Mnemonic encoded as follows:		4
		FULL	Fully dedicated mode	
		SEMI	Semi-dedicated mode	
		NONE	Dedication disabled	
DRUG MANAGEMENT				
<AmountValue>	A numerical value that specifies an amount of a drug.	Character sequence representing floating point number.		8
<AmountUnits>	The units associated with a drug amount.	Mnemonic encoded as follows:		8
		ng	ng	
		ug	ug	
		mg	mg	
		U	U	
		kU	kU	
		mmol	mmol	
		OFF	Bolus Off	
		HANDSON	Hands On Bolus	
		HANDSON/OFF	Hands On & Hands Free Bolus	
<DrugBolusRateDfltValue>	A numerical value that specifies the bolus rate that is used if such a value is not explicitly specified by the user.	Same as <BolusRateValue>		
<DrugBolusVolume>	A numerical value that specifies the bolus rate that is used if such a value is not explicitly specified by the user.	Same as <BolusVolume> or <OFF> to disable		
<ConcDfltValue>	A numerical value that specifies the concentration that shall be used if such a value is not explicitly specified by the user.	Same as <ConcValue> or <OFF> to disable parameter		
<ConcMaxValue>	A numerical value that specifies the highest acceptable drug concentration.	Same as <ConcValue> or <OFF> to disable parameter		
<ConcMinValue>	A numerical value that specifies the lowest acceptable drug concentration.	Same as <ConcValue> or <OFF> to disable parameter		

Parameter	Description Of Contents	Format		Max Width
<ConcUnits>	The units associated with a drug concentration.	Mnemonic encoded as follows:		8
		ng/ml	ng/ml	
		ug/ml	ug/ml	
		mg/ml	mg/ml	
		g/ml	g/ml	
		U/ml	U/ml	
		kU/ml	kU/ml	
		mmol/ml	mmol/ml	
<ConcValue>	A numerical value that specifies a drug concentration.	Character sequence representing floating point number.		8
<DoseRateDfltValue>	A numerical value that specifies the dose rate that is used if such a value is not explicitly specified by the user.	Same as <DoseRateValue> or <OFF> to disable parameter		
<DoseRateMaxValue>	A numerical value that specifies the highest acceptable dose rate.	Same as <DoseRateValue> or <OFF> to disable parameter		
<DoseRateMinValue>	A numerical value that specifies the lowest acceptable dose rate.	Same as <DoseRateValue> or <OFF> to disable parameter		
<DoseRateUnits>	The units associated with a drug dose rate.	Mnemonic encoded as follows		10
		ng/min		
		ng/kg/min		
		ug/min		
		ug/kg/min		
		ug/h		
		ug/kg/h		
		ug/24h		
		ug/kg/24h		
		mg/min		
		mg/kg/min		
		mg/h		
		mg/kg/h		
		mg/24h		
		mg/kg/24h		
		g/h		
		g/24h		

Parameter	Description Of Contents	Format		Max Width
		U/min		
		U/kg/min		
		U/h		
		U/kg/h		
		U/24h		
		U/kg/24h		
		kU/24h		
		mmol/h		
		mmol/kg/h		
<DoseRateValue>	The numerical value associated with a drug dose rate.	Character sequence representing floating point number		6
<DrugName>	The name of a drug.	Character sequence		20
<DrugOcclusionPressure>	Specifies the occlusion alarm pressure to be used when delivering the drug.	Same as <PressureValue> or <OFF> if parameter disabled		
<DrugServiceLevel>	Identifies the level of drug functionality supported by the syringe pump.	Mnemonic encoded as follows:		12
		NONE	No drug-related services supported	
		NAMESONLY	Support only for maintenance of drug names.	
		PROTOCOLS	Full drug protocol support.	
<NumDrugsDefined>	The number of drugs currently defined in the drug library.	Character sequence representing positive integer		3
<NumDrugsEnabled>	The number of drugs currently enabled in the drug library.	Same as <NumDrugsDefined>		
GENERIC ATTRIBUTES				
<ActivationStatus>	Specifies whether or not something is activated.	Mnemonic encoded as follows:		5
		ACTIV	Activated	
		DEACT	De-activated	
<AvailabilityStatus>	Specifies whether or not something is available.	Mnemonic encoded as follows:		8
		AVAIL	Available	
		NOTAVAIL	Not Available	
<ClosureStatus>	Specifies whether or not something is closed.	Mnemonic encoded as follows:		6
		OPEN	Open	
		CLOSED	Closed	

Parameter	Description Of Contents	Format		Max Width
<EnableStatus>	Specifies whether something is enabled or disabled.	Mnemonic encoded as follows:		7
		ENABLED	Enabled	
		DISABLED	Disabled	
<FitStatus>	Specifies whether or not something is fitted.	Mnemonic encoded as follows:		6
		FIT	Fitted	
		NOTFIT	Not fitted	
<PermitStatus>	Specified whether or not something is permitted.	Mnemonic encoded as follows:		8
		NOPERMIT	Permission denied	
		PERMIT	Permission granted	
<ProportionUnits>	The units associated with a proportion.	Mnemonic encoded as follows		1
		%	Percent	
<ProportionValue>	The numeric value associated with a proportion.	Character sequence representing floating point number		6
<RelayCoilStatus>	Specifies the status of the coil of a relay.	Mnemonic encoded as follows:		7
		ENRG	Energised	
		NOTENRG	Not energised	
<ResponseTimeUnits>	The units associated with a response time.	Character sequence		5
<ResponseTimeValue>	The numerical value associated with a response time.	Character sequence representing positive integer number.		
<SelectStatus>	Specifies whether or not something is selected.	Mnemonic encoded as follows:		7
		SLCT	Selected	
		NOTSLCT	Not selected	
<SuccessStatus>	Specifies the result of a test.	Mnemonic encoded as follows:		4
		FAIL	Test failed	
		PASS	Test passed	
<TimeoutUnits>	The units associated with a timeout.	Same as <TimeUnits>.		
<TimeoutValue>	The numerical value associated with a timeout.	Same as <TimeValue>.		
GRAPHICS DISPLAY				
<DisplayIlluminationLevel>	Specifies a display backlight illumination level.	Mnemonic encoded as follows:		4
		FULL	Full illumination	
		DIM	Low illumination	
		OFF	No illumination	

Parameter	Description Of Contents	Format		Max Width
INFUSION				
<BolusRateUnits>	The units associated with a bolus rate.	Same as <InfusionRateUnits>.		
<BolusRateDfltValue>	A numerical value that specifies the bolus rate that is used if such a value is not explicitly specified by the user.	Same as <BolusRateValue>		
<BolusRateValue>	The numerical value associated with a bolus rate.	Same as <InfusionRateValue>		
<BolusVolumeLimitValue >	The numerical value associated with a bolus volume limit.	Same as <VolumeValue>		
<InductionAmount>	The numerical value associated with an induction.	Same as <InfusionRateValue> or OFF		
<InductionUnits>	The units associated with an infusion rate.	Same as <ConcUnits>		
<InductionTime>	The units associated with an induction time.	Character Sequence		6
<MaintenanceRate>	The units associated with a Maintenance rate.	Same as <InductionRate>		
<MaintenanceRateUnits>	The units associated with a Maintenance rate.	Character sequence		6
<PauseAfterInduction>	The Boolean associated with a pause after induction.	Same as <EnableStatus>		
<InfusionMode>	Identifies the current infusion mode.	Mnemonic encoded as follows:		3
		BAC	Backoff	
		BOL	Bolus	
		HLD	Hold	
		IND	Induction	
		KVO	KVO	
		MLD	Multidose	
		SET	Set rate delivery	
		TIT	Titrating	
<InfusionRateUnits>	The units associated with an infusion rate.	Character sequence		6
<InfusionRateValue>	The numerical value associated with an infusion rate.	Character sequence representing floating point number		6
<InfusionTimeRemaining>	Specifies the time remaining before the current infusion reaches its End Of Infusion point.	Time remaining < 24 hrs	IEC8601 Duration24h	
		Time remaining >=24 hrs	"24+"	
<PurgeRateUnits>	The units associated with a purge rate.	Same as <InfusionRateUnits>.		
<PurgeRateValue>	A numerical value associated with a purge rate.	Same as <InfusionRateValue>		
<VI_Units>	The units associated with Volume Infused.	Character sequence		4

Parameter	Description Of Contents	Format		Max Width
<VI_Value> <VTBI_EndAction>	The numerical value associated with Volume Infused. Specifies the action taken when VTBI completion occurs.	Character sequence representing floating point number to a minimum of 2 decimal places		8
		Mnemonic encoded as follows:		4
		CONT	Continue at current rate	
		KVO	Switch to KVO rate	
		STOP	Stop	
SYRINGE PUMP MANAGEMENT				
<HospName>	The name of the hospital that owns or uses the syringe pump.	Character sequence		30
<InstSerialNo>	Syringe pump serial number.	Character sequence		20
<InstModelIdentifier>	Identifies the specifies syringe pump model variant.	Mnemonic encoded as follows:		15
		Asena CC	Asena® CC Syringe Pump	
		Asena GH	Asena® GH Syringe Pump	
		Asena GS	Asena® GS Syringe Pump	
		Asena TIVA	Asena® TIVA Syringe Pump	
<ManufacturerName>	Identifies the name of the syringe pump manufacturer.	Character sequence (fixed) "ALARIS INTERNATIONAL"		30
<ProgComponentID>	Uniquely identifies a programmable component within a syringe pump.	Mnemonic encoded as follows:		5
		MP	Main Processor	
		SP	Safety Processor	
		TCICP	TCI Communications Processor	
<ServiceDate>	Specifies a date associated with servicing of a syringe pump.	IEC8601 DateStamp		10
<ServiceMessage>	A user specified message to be displayed when servicing is required.	Character sequence		20
<UnitReference>	A means of syringe pump identification that is provided by the user.	Character sequence		20
<UsageSinceColdStartValue>	The numerical value of a time relating to usage since the unit was last cold-started.	Same as <TimeValue>		
<UsageSinceUseMonResetValue>	The numerical value of a time relating to usage since the user usage monitor was last reset.	Same as <TimeValue>		
<UsageUnits>	The units associated with a usage parameter.	Same as <TimeUnits>		
<VersionID>	Uniquely identifies a version of a specific component within a syringe pump.	Character sequence in "vX.Y.Z" format.		10
KEYPAD				
<KeyName>	Identifies a specific key on the keypad.	Mnemonic encoded as follows:		8

Parameter	Description Of Contents	Format		Max Width
		BOLUS	Bolus key	
		DEC	Decrement key	
		DECDEC	Fast decrement key	
		INC	Increment key	
		INCINC	Fast increment key	
		MUTE	Mute key	
		ONOFF	Soft on/off key	
		OPTIONS	Options key	
		PRESSURE	Pressure key	
		SOFTKEYA	Soft key A	
		SOFTKEYB	Soft key B	
		SOFTKEYC	Soft key C	
		START	Infusion start key	
		STOP	Infusion stop key	
<PressStatus>	Specifies whether or not a key is pressed.	Mnemonic encoded as follows:		7
		PRESS	Key pressed	
		RELEASE	Key released	
LOGGING				
<LatestLogEntryID>	The unique identification code associated with the most recent entry in a specified log.	Same as <LogEntryID>		
<LogEntryDescription>	Details of a recorded log entry.	Character sequence in local language		30
<LogEntryID>	Uniquely identifies a log entry within a syringe pump.	Character sequence representing positive integer number.		10
<LogEntryMnemonic>	Identifies the nature of a logging entry in a language-independent manner.	See Logging Mnemonic table		
<LogTimeStamp>	Specifies the time at which an entry was made in the log.	IEC8601 DateAndTimeStamp		19
<LogType>	Identifies the log that is being handled by a logging command.	Mnemonic encoded as follows		5
		EVENT	Event log	
		KEY	Key press log	
		FLUID	Fluid delivery log	
		SRVCE	Service log	
<MaxNumLoggedRecords>	Specifies the maximum number of log records that can be accommodated.	*Same as <NumLoggedRecords>*		
<NumLoggedRecords>	Specifies number of logged records.	Character sequence representing positive		5

Parameter	Description Of Contents	Format		Max Width
		integer.		
MOTOR				
<MotorTestStatus>	Specifies what state the motor test is in.	Mnemonic encoded as follows:		9
		UNDEFINED	Test state undefined.	
		INIT	In process of initialisation.	
		RUNNING	Test being performed	
		PASS	Test successful	
		FAIL	Test failed	
NURSE CALL				
<NurseCallMode>	Specifies action required to call nurse.	Mnemonic encoded as follows:		8
		ENTOCALL	Energise to call	
		DE-ENTOCALL	De-energise to call	
PATIENT MANAGEMENT				
<PatientServiceLevel>	Identifies the level of patient management services provided by the syringe pump in use.	Mnemonic encoded as follows:		12
		NONE	No patient management services supported.	
		WEIGHTONLY	*Maintenance of patient* weight supported.	
PHYSICAL QUANTITIES				
<AngleUnits>	The units associated with an angle.	Mnemonic encoded as follows		3
		deg	Degrees	
		Min	Minutes	
<AngleValue>	The numerical value of an angle.	Character sequence representing floating point number		6
<BatChargeUnits>	The units associated with a battery charge quantity.	Mnemonic encoded as follows		3
		Ah	Ampere hours	
		mAh	Milliampere Hours	
		UAh	Microampere Hours	
<BatChargeValue>	The numerical value of a battery charge quantity.	Character sequence representing floating point number		6
<CurrentUnits>	The units associated with a current.	Mnemonic encoded as follows		2

Parameter	Description Of Contents	Format		Max Width
		A	Amps	
		mA	Milliamps	
		UA	Microamps	
<CurrentValue>	The numerical value of a current.	Character sequence representing floating point number		6
<DiamUnits>	The units associated with a diameter.	Mnemonic encoded as follows		2
		mm	Millimetres	
<DiamValue>	The numerical value associated with a diameter.	Character sequence representing floating point number		6
<DistanceUnits>	The units associated with a distance.	Mnemonic encoded as follows:		2
		M	Metres	
		mm	Millimetres	
		um	Microns	
<DistanceValue>	The numerical value associated with a distance.	Character sequence representing floating point number		6
<ForceUnits>	The units associated with a force.	Mnemonic encoded as follows		3
		Kgf	Kilograms Force	
		N	Newtons	
<ForceValue>	The numerical value associated with a force.	Character sequence representing floating point number		6
<InductionUnits>	The units associated with an induction.			
<InductionTimeUnits>	Same as <TimeUnits>.			
<PressureLevel>	Specifies a pressure in terms of its bargraph level.	Mnemonic encoded as follows		3
		L-	Below L0	
		L0	Level 0	
		L1	Level 1	
		L2	Level 2	
		L3	Level 3	
		L4	Level 4	
		L5	Level 5	
		L6	Level 6	
		L7	Level 7	
		L8	Level 8	

Parameter	Description Of Contents	Format		Max Width
		L9	Level 9	
		L10	Level 10	
<PressureUnits>	The units associated with a pressure.	Mnemonic encoded as follows		4
		mmHg	Millimetres of mercury	
		Pa	Pascal	
<PresssureValue>	The numerical value associated with a pressure.	Character sequence representing floating point number		6
<TimeUnits>	The units associated with a time.	Mnemonic encoded as follows		4
		hrs	Hours	
		mins	Minutes	
		s	Seconds	
		ms	Milliseconds	
		us	Microseconds	
<TimeValue>	The numerical value associated with a time.	Character sequence representing positive integer.		6
<VoltageUnits>	The units associated with a voltage.	Mnemonic encoded as follows		2
		V	Volts	
		mV	Millivolts	
		uV	Microvolts	
<VoltageValue>	The numerical value associated with a voltage.	Character sequence representing floating point number		6
<VolumeUnits>	The units associated with a volume.	Mnemonic encoded as follows		2
		l	Litres	
		ml	Millilitres	
		ul	Microlitres	
<VolumeValue>	The numerical value associated with a volume.	Character sequence representing floating point number		6
<WeightUnits>	The units associated with a weight.	Mnemonic encoded as follows:		2
		kg	kilogram	
		mg	milligram	
		ug	microgram	
<WeightValue>	The numerical value associated with a weight.	Character sequence representing floating point number		6

Parameter	Description Of Contents	Format		Max Width
POWER SUPPLY				
<MainsStatus>	Specifies whether or not AC mains is connected.	Mnemonic encoded as follows:		6
		CON	Connected	
		NOTCON	Not connected	
REMOTE QUERY SUPPORT				
<RemQueryDescLine1>	Remote query description – line 1.	Character sequence		20
<RemQueryDescLine2>	Remote query description – line 2.	Same as <RemQueryDescLine1>		
<RemQueryOptionA>	Text displayed as part of a remote query – Option A.	Character sequence		10
<RemQueryOptionB>	Text displayed as part of a remote query – Option B.	Same as <RemQueryOptionA>		
<RemQueryResult>	Text that is identical to the remote query option text associated with the user's selection.	Same as <RemQueryOptionA>		
SENSORS				
<SensorCurrentUnits>	The units associated with the current flowing through a sensor.	Same as <CurrentUnits>		
<SensorCurrentValue>	The numerical value associated with the current flowing through a sensor.	Same as <CurrentValue>.		
<SensorOffsetVoltageUnits>	The units associated with the offset voltage output from a sensor.	Same as <VoltageUnits>		
<SensorOffsetVoltageValue>	The numerical value associated with the offset voltage output from a sensor.	Same as <VoltageValue>		
<SensorVoltageUnits>	The units associated with the voltage output from a sensor.	Same as <VoltageUnits>		
<SensorVoltageValue>	The numerical value associated with the output from a sensor.	Same as <VoltageValue>		
SYRINGE MANAGEMENT				
<SyrBrand>	The name of the brand of a syringe.	Character sequence		20
<SyrBrandNo>	The index number of a syringe brand within a series, where 0 <= <SyrBrandNo> < <SyrNumBrands>.	Character sequence representing positive integer.		5
<SyrConfirmStatus>	Specifies whether or not a syringe is (or can be) confirmed.	Mnemonic encoded as follows:		7
		CONF	Syringe confirmed / confirmable	
		NOTCONF	Syringe not confirmed / confirmable	
<SyrModel>	The name of a model of a syringe.	Character sequence		10
<SyrModelNo>	The index number of a syringe brand within a series, where 0 <= <SyrModelNo> < <SyrNumModels>.	Character sequence representing positive integer.		5
<SyrNumBrands>	The number of syringe brands available.	Character sequence representing positive integer.		5

Parameter	Description Of Contents	Format		Max Width
<SyrNumModels>	The number of syringe brands available within a specified brand.	Character sequence representing positive integer.		5
<SyrRecognitionStatus>	Specifies whether or not a syringe is recognised.	Mnemonic encoded as follows:		6
		REC	Syringe recognised	
		NOTREC	Syringe not recognised	
TRANSMISSION				
<DrvEngStatus>	Specifies whether or the drive is currently engaged or disengaged.	Mnemonic encoded as follows:		6
		ENG	Engaged	
		NOTENG	Not engaged	
<PlngrPosnUnits>	The units associated with a plunger position.	Same as <DistanceUnits>		
<PlngrPosnValue>	The numerical value of a plunger position.	Same as <DistanceValue>		
USER INTERFACE				
<LanguageCode>	Identifies a specific language.	Mnemonic encoded as follows:		3
		DUT	Dutch	
		ENG	English	
		FRN	France	
		GER	German	
		ITA	Italian	
		NOR	Norwegian	
		POR	Portuguese	
		SPN	Spanish	
		SWD	Swedish	
	Applies only to software versions 2.2.0 and above.	DAN	Danish	
	Applies only to software versions 2.2.0 and above.	RUS	Russian	
	Applies only to software versions 2.2.0 and above.	ROM	Romanian	
	Applies only to software versions 2.2.0 and above.	POL	Polish	
	Applies only to software versions 2.2.0 and above.	CZE	Czech	
	Applies only to software versions 2.2.0 and above.	FIN	Finnish	
	Applies only to software versions 2.2.0 and above.	HUN	Hungarian	
VISUAL STATUS INDICATORS				

Parameter	Description Of Contents	Format		Max Width
<VSI_Name>	Identifies a specific visual status indicator.	Mnemonic encoded as follows:		8
		ALARM_MP	Alarm VSI – Main Processor	
		ALARM_SP	Alarm VSI – Safety Processor	
		BATTERY	Battery VSI	
		HANDSET	PCA Handset indicator	
		START	Infusion start VSI	
		STOP	Infusion stop VSI	
		WARNING	Warning VSI	
<VSI_State>	Identifies a specific VSI state.	Mnemonic encoded as follows:		5
		FLASH	VSI flashing	
		OFF	VSI off	
		ON	VSI on	

4.3 Alarm Mnemonics

Mnemonic	Description
AL_ACDIS	AC disconnect alarm is active.
AL_CALLB	Callback is active because pump has been left unstarted, for more than 2 minutes (or 15 minutes if the extended callback had been set).
AL_COMTO	Communications timeout alarm active.
AL_LDSCN	Infusion line disconnection alarm is active.
AL_DRDIS	Plunger drive disengaged alarm is active.
AL_EMBAT	Empty battery alarm is active.
AL_EOIKV	End Of Infusion – KVO alarm is active.
AL_EOIST	End Of Infusion – Stop alarm is active.
AL_FAULT	Fault report is active. The actual fault code, and description are contained within the alarm text information.
AL_LBTAC	Low battery detected at power up on main, alarm active. This alarm is a user warning which indicates that the battery charge is already low in case they intend to use the pump on battery in the near future.
AL_LWBAT	Low battery alarm is active.
AL_NOALM	No alarms currently active.
AL_OCCLU	Occlusion alarm active.
AL_NEOIN	Near End Of Infusion alarm is active.
AL_PRDSC	Pressure disc removed alarm active.
AL_RHIGH	Excessive rate has been requested for fluid delivery to start.

Mnemonic	Description
AL_SYRCO	Syringe alarm is active (either because clamp has been disturbed or because plunger is not fitted).
AL_TCITG	TCI tag not recognised alarm active
AL_TITCA	Titration not confirmed for 10 seconds, callback tone is active.
AL_TITNC	Titration not confirmed for 2 minutes, alarm active.
AL_VTBIC	VTBI – Continue alarm active.
AL_VTBIK	VTBI – KVO alarm active.
AL_VTBIS	VTBI - Stop alarm is active.

4.4 Logging Mnemonics

Mnemonic	Description
EVENT LOGGING	
EV_ALARM	Alarm event stored as two events in sequence in the log, first event records the alarm origin the second the alarm nature text.
EV_BATOP	Event logs records operation on internal battery (occurs either at power up or if mains power is disconnected).
EV_BCKOF	Event logs backoff has terminated. The volume logged is the volume deducted from the volume infused.
EV_BOLEN	Event logs user has entered the bolus setup screen.
EV_BOLEX	Event logs exit of the bolus screen, and records the total bolus volume delivered.
EV_BOLSP	Event logs bolus rate fluid delivery has stopped, and the total bolus volume delivered since the user entered bolus setup.
EV_BOLST	Event logs bolus rate fluid delivery has started, and records the bolus rate.
EV_DRUGN	Event logs the name of the drug in use when infusion is started.
EV_LDSCN	Event logs detection of infusion line disconnection.
EV_LECOM	Event logs detection of completion of learn operation.
EV_PRGEN	Event logs user has entered the purge setup screen, the set purge rate is also recorded.
EV_PRGEX	Event logs exit of the purge screen, and the total purge volume delivered.
EV_PRSLV	Event logs the current pressure level and alarm level set (syringe force monitoring active). This is logged at infusion start and on the hour every hour.
EV_PRSHG	Event logs the current pressure and alarm pressure set in mmHg (line pressure monitoring active). This is logged at infusion start and on the hour every hour.
EV_PWRCO	Event logs a change in the state of the mains power input. The event logs either AC POWER RECONNECT or AC POWER FAIL.
EV_RATEL	Event log records the user response to a rate lock prompt. The response recorded is either RATE LOCKED or RATE LOCK OFF.
EV_RCFGD	Event log records the disabling of remote configuration.
EV_RCFGE	Event log records the enabling of remote configuration.
EV_RCTRD	Event log records the disabling of remote control.
EV_RCTRE	Event log records the enabling of remote control.
EV_RTCSE	Event logs the fact that the real time clock has been set (the event record will have the new time and date setting stored with the event record).
EV_SERSE	Event log records the fact that the service date has been set.
EV_SERVD	Event log records that a service due prompt has been presented to the user.
EV_SETCL	Event log records the fact that the user has affirmed that setup is to be cleared.
EV_START	Event logs the start of infusion, the set fluid delivery rate and current volume infused are logged.
EV_STOPI	Event logs the volume infused when infusion is stopped.
EV_SYRIN	Event logs the syringe brand and model when it is confirmed.
EV_TECHM	Events logs that a user entered tech mode.

Mnemonic	Description
EV_TITRA	Event logs a titration of the set rate, and records the new rate.
EV_VOLCL	Event logs the fact that the volume infused has been reset. The volume cleared is logged.
EV_VOLUM	Event logs the volume infused, this is recorded on the hour every hour.
EV_VTBIO	Event logs the fact that an active VTBI has been switched off.
EV_VTBIS	Event logs the setting of a new volume to be infused (VTBI). The volume and end condition are recorded (end conditions: STOP, KVO, CONTINUE).
EV_VTBIT	Event logs the setting of a time period for a volume to be infused (VTBI).
FLUID LOGGING	
FL_HRVIL	Hourly log of Volume Infused.
KEY LOGGING	
KY_CLICK	Key click, logged as one of the following: START STOP INC-INC INC DEC DEC-DEC SOFTA SOFTB SOFTC OPTIONS PRESSURE MUTE BOLUS
SERVICE LOGGING	
SV_FAULT	Fault code description including unique code, which can be reviewed against descriptions in the Technical Service Manual.

4.5 Representation Of Time-Related Quantities

Description	Purpose	Representation	ISO8601 Reference
DateStamp	To identify a specific point in time to a precision of one day.	CCYY-MM-DD	Para 5.2.1.1 extended format
DateAndTimeStamp	To identify a specific point in time to a precision of one second.	CCYY-MM-DDThh:mm:ss	Para 5.4.1 – calendar date and local time of day – extended format
Duration24h	To specify a duration of less than a day to a precision of one second.	hh:mm:ss	Para 5.3.1.1 extended format Para 5.5.3.2.1

4.6 Explanatory Notes

Note	Details
1	Constrained Commands Some commands can be used only if specified constraints are in place. If these conditions are not met, then the syringe pump will signal failure by not responding to the command.
2	Communications Response Times At the syringe pump level, the response time is defined as the time elapsing between the last stop bit of the incoming frame being received by the syringe pump to the time when the last stop bit of the response frame being issued. At the originator level, the communications response time depends on the nature of the link between the originator of the commands/queries and the syringe pump. In most cases, the link will be direct (e.g. a cable or infra red connection). However, in some cases, the connection may be indirect, due to use of routing equipment and/or networks. The delays associated with such intermediate equipment needs to be considered when designing a closed loop system. When using the Remote Features, care needs to be taken to ensure that performance of the overall system is sufficient to support the reversion timeout limits. In many cases, the number and complexity of background tasks that are handled by the syringe pump will determine the maximum communications response time. The COMMS_RESPONSE_MAX command has been provided to allow different syringe pumps to announce the value that is correct for them. It does, of course, raise the issue of what response time should be applied to the response to this command. Although response times are permitted to vary, the absolute maximum limit will be 3000ms.
3	Drug Selected Query Using the DRUG_SELECT Command On syringe pumps that provide no drug functionality, any use of the DRUG_SELECT command will fail. On syringe pumps that support drug names only the name activation status and the name will be returned On syringe pumps that support drug protocols, the concentration and dose rate parameters will be returned with activation status.
4	Event Log Information In The INF Command The INF command returns the ID of the latest Event Log record. For this reason, the <LogType> field will always contain the value associated with the Event Log.

Note	Details
5	Possible Effects Of Frequent Infusion Rate Changes At Slow Infusion Rates Whilst Infusing In some cases, changing the infusion rate whilst an infusion is in progress can disrupt the timing characteristics of the motor control algorithm. One example has been observed when operating at low infusion rates where the interval between successive motor pulses / steps was longer than the interval between infusion rate changes. In this particular case, a new pulse / step was triggered with each rate change. As a consequence, because the rate changes were regular and frequent, the effective infusion rate increased accordingly. Such an effect would be detectable by monitoring the rate of change of volume infused, which would increase proportionately. Additional care would be required in determining how to respond to such an unexpected increase in volume infused. If the response was to send a stream of reducing rate changes, intended to slow down the infusion rate, the effect could be made worse. The correct approach would be to switch to a zero rate for an appropriate time, recommencing at a non-zero rate some time later.
6	Remote Control Of Infusion It is strongly recommended that, whilst infusion is being controlled remotely, that the syringe pump is regularly queried to ensure that key parameters behave as expected (e.g. infusion rate, syringe pump serial number, etc.).
7	VI Clear Operation And Inhibition The INF_VI_CLEAR_CTRL setting will always default to ENABLED when a syringe pump is powered up or remote control is not enabled. The state of the INF_VI_CLEAR_CTRL parameter will have no effect on the operation of the INF_VI_CLEAR command - it will work whenever the specified constraints are in place.
8	Retrieval Of Logging Records For a given log, each record will be provided with a unique identification code, which consists of a number that is always one greater than the ID of the previous record. This pattern of allocation continues in the event of the circular buffer being filled up and oldest records being overwritten. In order to retrieve all of the records in a log, it is necessary to start by issuing the LOG_NUM_RECORDS command to determine how many records are available and the ID of the most recent record. The earliest record ID can be determined by means of the following calculation: Earliest Log Entry ID = Latest Log Entry ID – (NumRecordsAvailable – 1) Records can be retrieved in any order, with or without gaps in between (i.e. random access). Detection of a full log buffer can be achieved by determining whether or not the values of <MaxNumLoggedRecords> and <NumLoggedRecords> are identical. Obviously, <NumLoggedRecords> shall never exceed <MaxNumLoggedRecords>. It should be noted that new records might be added during the retrieval process. A consequence of this is that, if the buffer is full, the oldest record(s) will be overwritten. This would cause an attempt to retrieve it to fail. Hence, if a retrieval fails whilst the buffer is full, issuing LOG_NUM_RECORDS will enable detection of a numerically greater Log Entry ID, indicating that this scenario has occurred.
9	Motor Testing It is not possible to activate a motor test using communications. It is, however, possible to monitor the progress of such a test, as a user performs it. The expected behaviour will be as follows: Most of the time, the motor test status will be UNDEFINED, since the syringe pump will be operating normally. When a motor test is started, it will briefly pass through an INIT (initialising) state, after which it will normally enter a RUNNING state. At some point, the test will complete, reporting a status of PASS or FAIL. When the user exits the motor test feature, the reported status will revert to UNDEFINED. Note that, during state transitions, it is acceptable for the motor status to be reported as UNDEFINED. However, whilst a test is in progress, the time in such a condition is likely to be short in relation to the overall test time.

Note	Details
10	Remote Feature Characteristics In order for some commands to be accepted, it will be necessary to ensure that the appropriate Remote Mode has been enabled. After power-up of a syringe pump, all remote modes will be disabled. By issuing an appropriate command, the required mode can be enabled. In order to keep the remote feature enabled, it is necessary to issue enabling commands within the reversion timeout limit of 10 seconds. After this time elapses, it will be necessary to re-issue the enabling command to re-enable the Remote Feature. Note that there may be times when the syringe pump will refuse to grant an enabling request. Such failure will be detectable by checking the appropriate field of the response. A command will be ignored if it requires a specific Remote Feature to be enabled that is not enabled.
11	Communications Security Code The Communications Security Code (CSC) is used as a means of ensuring that some features of a syringe pump are accessible only to parties whose use of them is known and accepted by ALARIS Medical Systems. Users wishing to be provided with information about how the code can be determined by an application should contact the ALARIS Medical Systems® International Marketing Department. Where the code appears in a response to a command or query, its contents will be disguised in a manner that will minimise the likelihood of its construction being easily deducible.
12	Remote Query Operation The Remote Query operation provides a means by which a syringe pump can be made to offer a user a choice between two possibilities and for the selection to be returned to the communications host. It will be used in the following manner. Initially, the Remote Query feature will be inactive. Whilst in this state, it may or may not be possible for it to be activated. This can be determined by querying the status to ensure a result of POSSIBLE. The reported result at this stage will be UNKNOWN. In order to activate a Remote Query, the appropriate command shall be issued, providing the text that is to be displayed on the screen of the syringe pump. Immediately afterwards, a status check shall be performed to ensure that there has been a transition to the WAITING state (or the FINISH state if the user has responded quickly to the query). If this has not occurred, it will be because the pump has moved to a state where a Remote Query cannot be issued. A Remote Query can be deactivated at any time it is in the WAITING state. This can be used if the host wishes to impose a time limit for the response. Whilst in the WAITING state, the reported result will be UNKNOWN. When the user responds to the query, the status will change to FINISH. From this point onwards, the reported result will reflect the option selected by the user. The result will be held for as long as the query remains enabled. Once the host has queried the result, the Remote Query shall be disabled, causing the syringe pump screen to revert to its normal state.
13	Remote Syringe Confirmation Use of the SYRINGE_CONFIRM command is intended to be limited to querying whether or not a syringe is confirmed. Use of it to actually cause the syringe pump to confirm the syringe is intended only in systems that have been designed by or approved by ALARIS Medical Systems. It should be noted that the feature may not be supported on many models.
14	Syringe Cover Closure Detection This feature is not currently implemented on Asena® Syringe Pumps.

Note	Details
15	Modification Of Maximum And Default Occlusion Alarm Levels When attempting to modify the default and maximum occlusion alarm levels, care must be taken that the syringe pump is never left in a condition where the default level never exceeds the maximum level. The following procedure shall be used, WHEN SETTING THE DEFAULT LEVEL (to a value we will call DL) Read the current maximum level. If it is below DL, then issue a command to set the maximum level to DL (or higher). Issue a command to set the default level to DL. WHEN SETTING THE MAXIMUM LEVEL (to a value we will call ML) Read the current default level. If it is above ML, then issue a command to set the default level to ML (or lower). Issue a command to set the maximum level to ML. When setting defaults and max on units that do not have pressure sensors only a level should be sent. The response will come back with a level and an equivalent pressure. When setting defaults and max on units that have a pressure sensor fitted the level field must be blank and the pressure values valid or else the level will be used. The response will have a blank for the level field as a pressure which does not correspond to an exact level cannot be converted.
16	Maximum Occlusion Alarm Levels It should be noted that some syringe pumps will not support modification of the maximum occlusion alarm level.
17	Drug Lib Add The use of the "drug lib add" command will result in the addition of a drug to the library (if the library is available and the associated name is valid). The status of the drug will be set to disabled. If drug protocols are available the parameters will be set to the following values. Dose Rate – Max Dose Rate 0.01 Default Dose Rate 0.01 Min Dose Rate 0.01 Dose Rate Units ug/kg/min Conc - Max Conc Rate 9990 Default Conc 9990 Min Conc 9990 Conc Units mg/ml Bolus – Rate OFF Vol 0.5ml Occln Alarm L1
18	Setting of Drug Library Parameters The validity of a drug protocol is dependent upon all four possible groups of data – dose rate, concentration, bolus and occlusion. If any of these are applied to a library entry it will result in that entry becoming disabled. To enable the entry with the relevant command the protocol must be valid for the command will fail. A typical procedure would be to add a drug then set the four data sets then enable the drug.
19	Drug Setup On syringe pumps that provide no drug functionality, any use of the DRUG_SETUP command will fail. On syringe pumps that support drug names only the name activation status and the name will be returned if a drug is active. On syringe pumps that support drug protocols, the concentration and dose rate parameters will be validated and the command will fail if they are outside limits. This command will fail if the infusion is in progress, a drug is already in use or if the dose rate units are weight dependent a valid weight must have been supplied. In order to de-select all drugs, issue the DRUG_SETUP command with the <ActivationStatus> set to its de-activated value.

Note	Details
20	Patient Weight The patient weight setting command will fail if infusion is in progress or if a drug is already in use.
21	Drug Bolus Only volume unit of ml is valid. TIVA has the following default Bolus rates ONLY, 150ml/h, 300ml/h, 600ml/h, 900ml/h and 1200ml/h.

5 Acknowledgement Of Commands

Where a response is generated, it is intended to indicate the following to the originator:

- That the contents of the received data frame were valid.
- That the command or query was recognised by the Application Layer.
- That, where appropriate, the number of additional fields was as expected and that their contents were valid.
- For commands, that the requested outcome was successfully achieved (including verification that applicable constraints were in place).

It is expected that the client will detect any lack of response and perform some form of error recovery (e.g. activate a re-try mechanism).

6 Remote Configuration and Control Modes

The Asena® Syringe Pump Communications Protocol provides the means by which a syringe pump can be made to support remote configuration (using REMOTE_CFG) and remote control (using REMOTE_CTRL); the use of these enabling commands requires the provision of a security code. This measure is intended to highlight the responsibility inherent in configuring settings using the communications protocol and in using a system in which the pump is controlled remotely.

The assessment for the suitability of any software / firmware used in the clinical environment to control or receive data from the pump lies wholly with the user of the equipment. Such software / firmware should include detection of disconnection or other failure of the communications link. Any connected analogue and digital components are required to meet EN60950 for data processing and EN60601 for medical devices. Anyone connecting additional devices to the signal input or output is a system configurator and responsible for meeting the requirements of the system standard EN60601-1-1. Anyone wishing to implement either remote configuration or remote control must:

Ensure that the system in which the pump is to be used is approved to EN60950 and EN60601.

Ensure full compliance with all relevant requirements and constraints associated with use of the Asena® Syringe Pump Communications Protocol.

Ensure that the system checks that any Configuration or Control information supplied to the syringe pump has been correctly received and acted upon.

Ensures that the system checks that communications is operating reliably at all times.

6.1 Security Code

The security code has been designed to be unique for each syringe pump by basing the contents on the syringe pump serial number. Clearly for such uniqueness to be achieved, it is necessary for the serial number of each syringe pump to be stored electronically within the syringe pump (e.g. using an appropriate technical support function).

Asena® Syringe Pump serial numbers consist of a sequence of nine numerals (0-9) separated with a single hyphen (-) character (e.g. 8001-04659). In order to construct the security code for a given syringe pump, it will be necessary to read the syringe pump serial number using the INST_SERIAL_NO communications command.

It is expected that applications capable of controlling and/or configuring more than one syringe pump at a time will ensure that no two syringe pumps have identical serial numbers.

6.2 Security Code Construction

The security code consists of four hexadecimal characters (0–9, A–F (lower case invalid)) representing a 16-bit Cyclic Redundancy Check (CRC) value.

The CRC is based on the parameterised Rocksoft Model CRC algorithm [See Section 7 Ref 2] with the following parameters:

Attribute	Value
Name	CRC-CCITT
Width	16 bits
Polynomial	$X^{16} + x^{12} + x^5 + 1$ (0x11021)
Initial Value	0xFFFF
Reflect On Input	FALSE
Reflect On Output	FALSE
XOR Output Width	0x0000
Check	Not applicable

The CRC is calculated for all characters in the serial number (scanning left to right), but excluding any termination characters (e.g. NULL or <CR>) associated with the string.

6.3 CRC Calculation 'C' Source Code

The following 'C' source code is the same as that which is used in Asena® Syringe Pumps to calculate the communications security code. Authorised users of the security code are permitted to use this source code in their own applications.

The code consists of a single function which calculates and returns the CRC associated with a contiguous block of bytes of specified size. The calling function should provide in 'Block' a pointer to the start address of the array containing the syringe pump number string that is to be used. In 'BlockSize', it should provide a constant representing the length of a serial number (i.e. 10). The returned value is a structure containing the high and low bytes of the security code.

```
#define  CRC_SEED_VALUE             (0xFFFF)
#define  NUM_HEX_DIGITS_IN_CRC      (4u)
#define  WORD_LOW_BYTE              ((WordT) 0x00FFU )
#define  WORD_HIGH_BYTE             ((WordT) 0xFF00U )
#define  BYTE_SIZE                  (8u)

typedef unsigned char  ByteT;
typedef unsigned int   WordT;
typedef struct
{
      ByteT  LowByte;
      ByteT  HighByte;
}     CRC_T;

/*****************************************************************************/
/*    F U N C T I O N                                                        */
/*                                                                           */
/*    This function returns a CRC for a sequence of bytes of specified length. */
/*****************************************************************************/

CRC_T CRC_CalcForBlock( const void * const Block, size_t BlockSize )
{
      CRC_T          CRC_Returned;
      WordT          CRC_Value;
      WordT          CRC_Operand;
      WordT          TableOperand;
      WordT          MemoryOperand;
      ByteT const *  Ptr;
      size_t         i;

      static const unsigned int CRC_Table[256u] =
      {
            0x0000, 0x1021, 0x2042, 0x3063, 0x4084, 0x50A5, 0x60C6, 0x70E7,
            0x8108, 0x9129, 0xA14A, 0xB16B, 0xC18C, 0xD1AD, 0xE1CE, 0xF1EF,
            0x1231, 0x0210, 0x3273, 0x2252, 0x52B5, 0x4294, 0x72F7, 0x62D6,
            0x9339, 0x8318, 0xB37B, 0xA35A, 0xD3BD, 0xC39C, 0xF3FF, 0xE3DE,
            0x2462, 0x3443, 0x0420, 0x1401, 0x64E6, 0x74C7, 0x44A4, 0x5485,
            0xA56A, 0xB54B, 0x8528, 0x9509, 0xE5EE, 0xF5CF, 0xC5AC, 0xD58D,
            0x3653, 0x2672, 0x1611, 0x0630, 0x76D7, 0x66F6, 0x5695, 0x46B4,
            0xB75B, 0xA77A, 0x9719, 0x8738, 0xF7DF, 0xE7FE, 0xD79D, 0xC7BC,
            0x48C4, 0x58E5, 0x6886, 0x78A7, 0x0840, 0x1861, 0x2802, 0x3823,
            0xC9CC, 0xD9ED, 0xE98E, 0xF9AF, 0x8948, 0x9969, 0xA90A, 0xB92B,
```

```
            0x5AF5, 0x4AD4, 0x7AB7, 0x6A96, 0x1A71, 0x0A50, 0x3A33, 0x2A12,
            0xDBFD, 0xCBDC, 0xFBBF, 0xEB9E, 0x9B79, 0x8B58, 0xBB3B, 0xAB1A,
            0x6CA6, 0x7C87, 0x4CE4, 0x5CC5, 0x2C22, 0x3C03, 0x0C60, 0x1C41,
            0xEDAE, 0xFD8F, 0xCDEC, 0xDDCD, 0xAD2A, 0xBD0B, 0x8D68, 0x9D49,
            0x7E97, 0x6EB6, 0x5ED5, 0x4EF4, 0x3E13, 0x2E32, 0x1E51, 0x0E70,
            0xFF9F, 0xEFBE, 0xDFDD, 0xCFFC, 0xBF1B, 0xAF3A, 0x9F59, 0x8F78,
            0x9188, 0x81A9, 0xB1CA, 0xA1EB, 0xD10C, 0xC12D, 0xF14E, 0xE16F,
            0x1080, 0x00A1, 0x30C2, 0x20E3, 0x5004, 0x4025, 0x7046, 0x6067,
            0x83B9, 0x9398, 0xA3FB, 0xB3DA, 0xC33D, 0xD31C, 0xE37F, 0xF35E,
            0x02B1, 0x1290, 0x22F3, 0x32D2, 0x4235, 0x5214, 0x6277, 0x7256,
            0xB5EA, 0xA5CB, 0x95A8, 0x8589, 0xF56E, 0xE54F, 0xD52C, 0xC50D,
            0x34E2, 0x24C3, 0x14A0, 0x0481, 0x7466, 0x6447, 0x5424, 0x4405,
            0xA7DB, 0xB7FA, 0x8799, 0x97B8, 0xE75F, 0xF77E, 0xC71D, 0xD73C,
            0x26D3, 0x36F2, 0x0691, 0x16B0, 0x6657, 0x7676, 0x4615, 0x5634,
            0xD94C, 0xC96D, 0xF90E, 0xE92F, 0x99C8, 0x89E9, 0xB98A, 0xA9AB,
            0x5844, 0x4865, 0x7806, 0x6827, 0x18C0, 0x08E1, 0x3882, 0x28A3,
            0xCB7D, 0xDB5C, 0xEB3F, 0xFB1E, 0x8BF9, 0x9BD8, 0xABBB, 0xBB9A,
            0x4A75, 0x5A54, 0x6A37, 0x7A16, 0x0AF1, 0x1AD0, 0x2AB3, 0x3A92,
            0xFD2E, 0xED0F, 0xDD6C, 0xCD4D, 0xBDAA, 0xAD8B, 0x9DE8, 0x8DC9,
            0x7C26, 0x6C07, 0x5C64, 0x4C45, 0x3CA2, 0x2C83, 0x1CE0, 0x0CC1,
            0xEF1F, 0xFF3E, 0xCF5D, 0xDF7C, 0xAF9B, 0xBFBA, 0x8FD9, 0x9FF8,
            0x6E17, 0x7E36, 0x4E55, 0x5E74, 0x2E93, 0x3EB2, 0x0ED1, 0x1EF0
    };

    CRC_Value = CRC_SEED_VALUE;
    Ptr = Block;

    for ( i = 0U; i < BlockSize; i++ )
    {
            MemoryOperand = (WordT) *Ptr++;
            TableOperand  = CRC_Table[ ( (CRC_Value >> BYTE_SIZE) ^ MemoryOperand ) ];
            CRC_Operand   = ( ( CRC_Value & WORD_LOW_BYTE ) << BYTE_SIZE );
            CRC_Value     = ( TableOperand ^ CRC_Operand );
    }

    CRC_Returned.LowByte  = (ByteT) ( CRC_Value & WORD_LOW_BYTE );
    CRC_Returned.HighByte = (ByteT) ( ( CRC_Value & WORD_HIGH_BYTE ) >> BYTE_SIZE );

    return ( CRC_Returned );
}
```

7 References

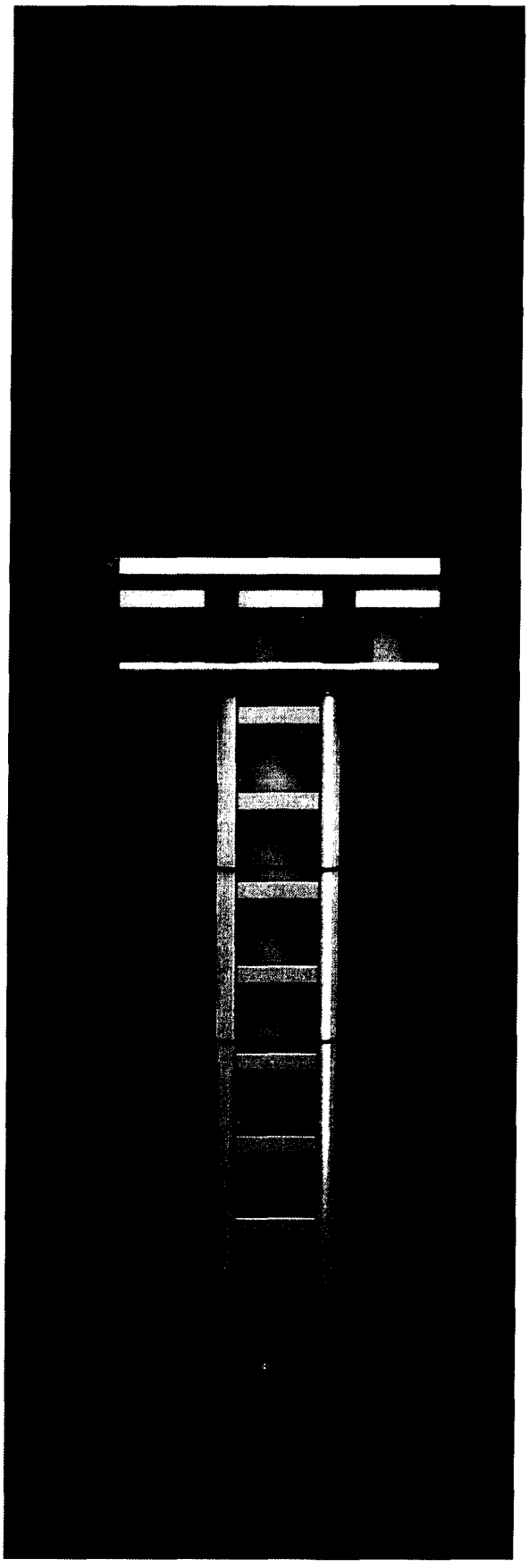
1. "Infrared Data Association Serial Infrared Physical Layer Specification", v1.3, October 15 1998
2. "CRCs – A Painless Guide", Ross N Williams, Rocksoft Pty Ltd., 19 August 1993, ftp site ftp.rocksoft.com/papers/crc_v3.txt.
3. ISO8601:1988 "Data elements and interchange formats – Information interchange – Representation of dates and times", First edition 1988-06-15

8 Protocol Revision History

Issue	CO No.	Protocol Rev.	Changes	Changed by	Date
C	CO2309	1	First published issue.	P. Templeton	24th July 2000
1	CO2347	1	Production Release	T. Fry	28th July 2000
2	CO2686	2.1.1	Released with Asena® CC Syringe Pump Software version 1.5.x Change to drug commands for CC DRUG_SELECT is now only a query command. A drug from the library cannot be selected. DRUG_LIB_BOLUS, DRUG_LIB_OCCLN_ALARM, DRUG_LIB_CONC and DRUG_LIB_DOSERATE have been changed. Not used in previous version these now better match the user interface. DRUG_LIB_SETUP has been added. This allows the remote set up of a drug name or a drug name and relevant conc. and doserate. PRESSURE_OAL_MAX has been added. PRESSURE_OAL_DEFAULT and PRESSURE_OAL have been modified to cope with pressure levels and pressure in mmHg.	M. Richardson	6th Feb 2001
3	CO4653	2.1.2	Released with Asena® TIVA Syringe Pump Software version 1.6.2 Added new commands for: INF_INDUCTION DRUG_LIB_INDUCTION	S Morling	28 August 03
		2.1.3	Added new commands for: INF_HANDSFREE INF_MANUAL_BOLUS INF_PURGE_PRIME_SYRINGE INF_VTBI_CLEAR PRESSURE_AUTO_SET PRESSURE_LEVEL_CAP VI_BATTERY_ICON VI_CALLBACK_TIME		
4	N/A	2.1.4	Released with Asena® CC Syringe Pump with Guardrails® Software version 3.0.x Added the commands and restrictions for the Asena® CC Syringe Pump with Guardrails. COMMS_RS232_LOOP_TEST command removed. Reported name of pump is "Asena CC_G"	S Morling	28 August 03

ALARIS®
MEDICAL SYSTEMS

Asena®
Gateway Workstation



Asena® Gateway Workstation

Directions for Use

ENGLISH

Contents

Introduction

The Asena® Gateway Workstation has been designed as a modular system providing a communications gateway between the Asena® Infusion Pump and any Patient Data Management System (PDMS), Patient Monitoring (PM) System or Clinical Information System (CIS) that requires access to the infusion data retained within the pump.

- Central management system for multiple Asena® Infusion Pumps
- Medical Device Interface (MDI) – a unique mounting mechanism providing data communications and mains power to the Alaris® Infusion Pump
- Reduced cable clutter with the use of a single AC power inlet
- Simple to set up with adaptable modular design
- Efficient organisation of multiple infusion lines and configurations
- Battery back-up in the event of power supply interruption
- Optional high visibility beacon assists with the location of pumps in an alarm state
- Nurse call interface for all Asena® Infusion Pumps attached to the Asena® Gateway Workstation
- Software running on the Asena® Gateway Workstation allows remote access to the device

The device supports optional upgrades to enhance the data communication interfaces and to support software for connections to such client / server systems.

Data can be accessed and the software installed on the Asena® Gateway Workstation can be configured from a client PC using a standard Web browser; this may be performed over an Ethernet connection or by directly linking to the Asena® Gateway Workstation.

The software is provided under and is subject to a license from ALARIS Medical UK Ltd.

About this Manual

The user must be thoroughly familiar with the Asena® Gateway Workstation described in this manual prior to use. Please refer to the Asena® Infusion Pump Directions For Use for correct operation of the infusion pumps. Directions for Use for software installed on the Asena® Gateway Workstation can be accessed from a client PC using a standard Web browser.

Warnings and Cautions

The Warning heading alerts the user to a potentially serious outcome (death, injury or serious adverse events) to the patient or user.

The Caution heading alerts the user to take special care for the effective use of the pump or software.

Symbol Definitions

Nurse Call Connector

RS232 Connector

Auxiliary Connector

Interface Device, General (Barcode Reader Connector)

Ethernet Network Connector

Mains Inlet

Mains Outlet

Attention (Consult accompanying documents)

Important Information

Potential Equalisation (PE) Connector

This equipment contains an RF transmitter (where fitted)

Type CF Equipment (Degree of protection against electrical shock)

IPX1

Protected against vertically falling drops of water

Alternating Current

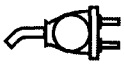
The device complies with the requirements of the EC Directive 93/42/EEC. Registered with the CE Mark.

Date of Manufacture

Controls and Indicators

ON/OFF - Press once to switch the Asena® Gateway Workstation on. Press and hold for 3 seconds to switch the Asena® Gateway Workstation off. In the event that the system needs to be reset, depress and hold for at least 4 seconds, then press again to switch the Asena® Gateway Workstation on.

BATTERY - When illuminated the Asena® Gateway Workstation is operating from the internal battery; when flashing the battery power is depleted.



AC POWER - When illuminated the Asena® Gateway Workstation is connected to the mains supply and the internal battery is being charged.

A

B

'A' Status Indicator - Provides a visual indication that the software is operational.

'B' Status Indicator - Provides a visual indication that the network is operational.

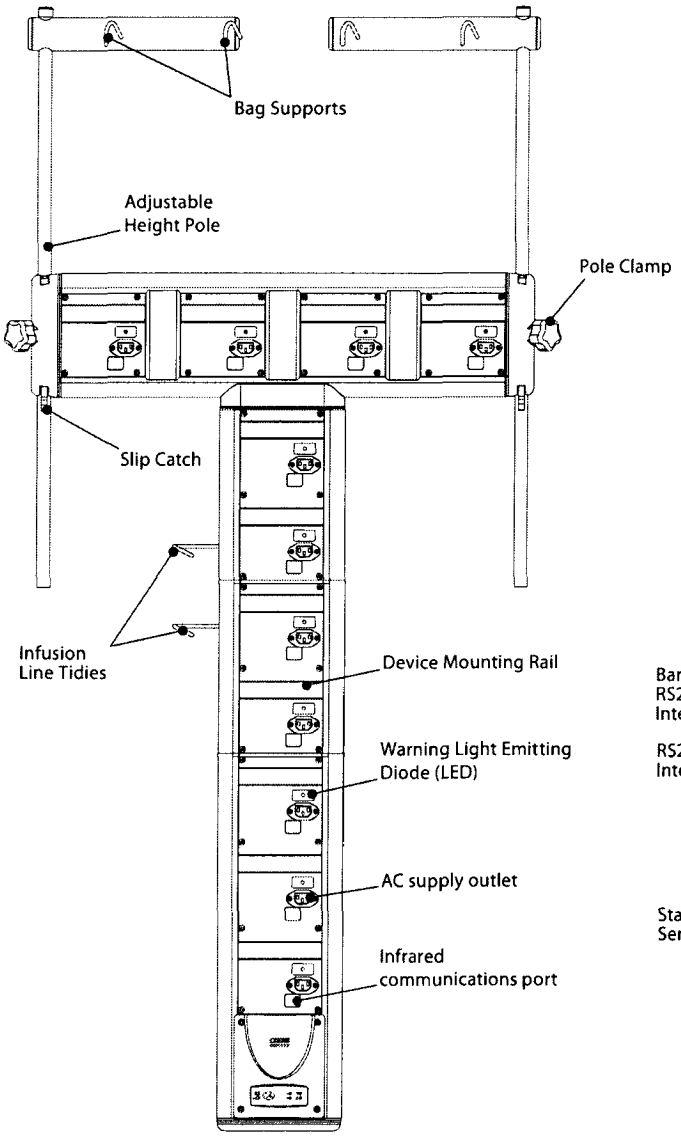
'ON' Status Indicator - When illuminated the Asena® Gateway Workstation is operational.

System Fault Indicator – Asena® Gateway Workstation will illuminate this indicator when an internal fault is present and detected (Consult accompanying documents for further information).

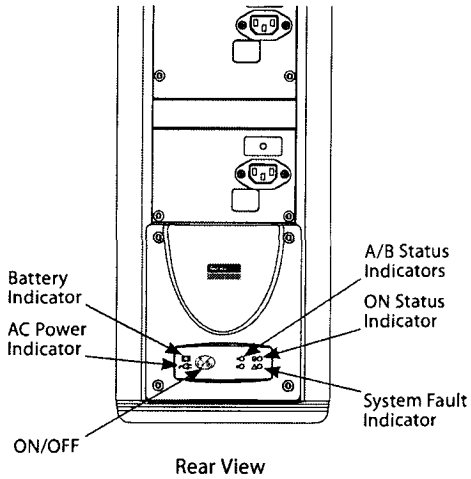
Features of the Asena® Gateway Workstation

Modular Design

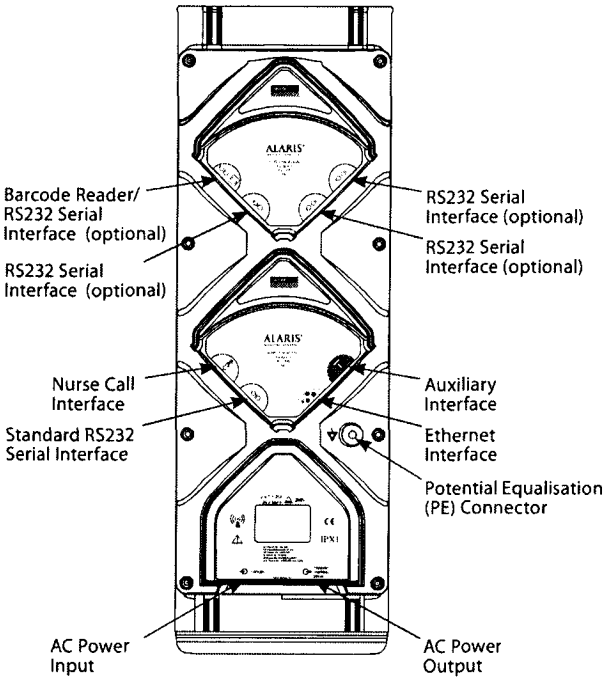
The Asena® Gateway Workstation is a modular design that allows for future expansion of the number and positions of MDI tiles available. The base unit comprises of 3 MDI tiles, with modules of 2 MDI tiles expanding the vertical configuration. Horizontal T-pieces of 2, 3 or 4 MDI tiles may be added to accommodate the Asena® Infusion Pump and fluid bag hangers, as required. The Asena® Gateway Workstation can only be modified by a qualified service engineer.



Backbone (3 MDI Tile Base)
Unit Front View



Rear View



System Fault Indication

Continuous monitoring of the power distribution and communications system integrity is performed by the Asena® Gateway Workstation. In the unlikely event that a system fault occurs whilst in use, the System Fault Indicator will be illuminated accompanied by an audible alarm. To avoid any possible interruption to the infusion, AC power to the Infusion Pump will be maintained on the MDI tile should a system fault be detected. The Workstation briefly illuminates the System Fault Indicator and activates the audible alarm each time the device is switched on.

Caution: If the System Fault Indicator fails to illuminate when the Asena® Gateway Workstation is switched on, remove the Asena® Gateway Workstation from service and contact a qualified service engineer.

Caution: Should a System Fault occur during use remove the Asena® Gateway Workstation from service as soon as practical and contact a qualified service engineer.

Features of the Asena® Gateway Workstation

Power Input

The Asena® Gateway Workstation is powered from the mains supply through a standard IEC mains connector. When connected to the mains supply the AC Power indicator is illuminated. Both the Live and Neutral lines of the main supply are protected using fuses carried in a double fuse holder located on the mains inlet connector.

Warning: When connected to the mains supply, a three wire (Live, Neutral, Earth) supply must be used. If the integrity of the external protective conductor in the installation or its arrangement is in doubt, then the Asena® Gateway Workstation must not be used.

Battery Supply

The Asena® Gateway Workstation should normally be operated from the AC power supply. However, in the event of temporary loss of AC power, an internal power supply will provide approximately 20 minutes of additional operational time. AC Power should be re-applied as soon as possible. The Battery indicator illuminates whenever the Workstation is running from the internal battery. When the internal battery is depleted the Battery indicator will start to flash before the system automatically powers down. The battery is automatically charged whenever the Asena® Gateway Workstation is connected to the mains supply. As the Asena® Gateway Workstation is designed to operate from the AC power supply it will only power up when connected to the mains supply.

AC Power Output to Infusion Pumps

The Asena® Gateway Workstation has its own power distribution circuit to supply mains voltage to the attached Asena® Infusion Pumps. For safety, power is not applied to the MDI tile IEC connector until the Asena® Infusion Pump is fully attached to the MDI tile. The AC power indicator on the infusion pump will also illuminate.

Warning: The MDI tile mains outlet connection is intended only for connection to an Asena® Infusion Pump. NEVER attach any other equipment to the outlet connector.

The Asena® Gateway Workstation minimises the potential for a high peak in-rush current to exist when mains power is simultaneously applied to the Infusion Pumps. When the Workstation is initially switched on, or when re-connected to the mains whilst running off the internal battery, a small delay in the application of main power will occur between each MDI tile. This staggers the distribution of mains power to all pumps and therefore, reduces the peak in-rush current.

AC Power Output to a Second Asena® Gateway Workstation

The Asena® Gateway Workstation is fitted with an auxiliary mains outlet connection. When limited access to main power exists, a second Asena® Gateway Workstation can be powered from this IEC mains outlet connector.

Caution: The auxiliary mains outlet connector is not switched and is live whenever mains power is applied to the Asena® Gateway Workstation.

Warning: To avoid exceeding the maximum permissible system earth leakage current of 500µA, the total number of Asena® Infusion Pumps fitted on both Workstations may be determined from the following formula:

15µA	x number of Asena® GW Volumetric Pumps fitted
+ 35µA	x number of Asena® Syringe Pumps fitted
+ 90µA	x 2 Asena® Gateway Workstations
Less than 500µA	

If in any doubt connect each Asena® Gateway Workstation to a separate mains supply.

Warning: The auxiliary mains outlet is intended only for connection to a second Asena® Gateway Workstation or an authorised ALARIS product. NEVER attach more than one Asena® Gateway Workstation or any other equipment to the outlet connector.

Alarm Location Beacon (where fitted)

A beacon is mounted on the upper face of the Asena® Gateway Workstation to assist with identifying the location of any Asena® Infusion Pumps that have entered an alarm or warning state. When lit, the beacon colour matches that of the visual status indicator on the Asena® Infusion Pumps; red for alarms and amber for warnings. The beacon flashes automatically whenever any Asena® Infusion Pump attached to the Workstation enters the alarm or warning condition, and stops when the condition is cleared on the pump. The intensity of the Alarm Location Beacon is configurable using the Web Service. The Alarm Location Beacon automatically illuminates red then amber each time the Asena® Gateway Workstation is switched on.

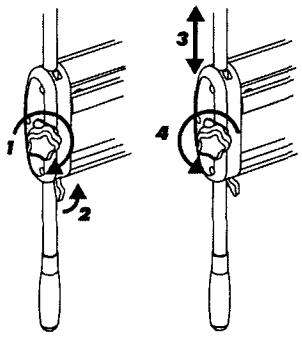
Caution: If the Alarm Location Beacon fails to illuminate when the Asena® Gateway Workstation is switched on, suspect a fault with the beacon. Remove the Asena® Gateway Workstation from service and contact an approved engineer.

Note: Alarm beacon cannot be fitted to a 4 MDI Tile Horizontal Module.

Adjustable Height Bag Hangers

The 18 mm adjustable height pole has been designed as a convenient means of securing the fluid bags onto the Asena® Gateway Workstation. The pole supports a maximum load equivalent to 2.5 kg (2.0 kg when transported on a trolley). The pole is held securely by a clamp and a slip catch. This gives additional flexibility when selecting the required height of the fluid bags. To operate the clamp:

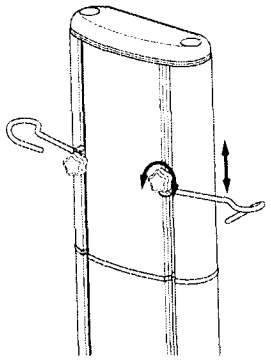
1. Grip the handle at the lower end of the pole and carefully loosen the hand wheel.
2. Holding the pole, release the locking lever; this will allow the pole to move freely.
3. Adjust the pole so that the fluid bag will be suspended at the desired height.
4. Tighten the hand wheel to securely lock the pole into position.



Infusion Line Tidies

To assist in the routing of infusion sets and syringe extension sets from the Asena® Gateway Workstation to the patient, line tidies can be attached to the rear of the Gateway. The infusion line tidies are height adjustable allowing positioning adjacent to both syringe and volumetric pumps, and may be mounted on the left or right hand side of the Gateway. To use the infusion line tidies:

1. Loosen the hand wheel and adjust to the desired position.
2. Hand tighten the hand wheel to secure the device.
3. Refit rubber strip.



Hospital Equipment Rail Mounting

A mounting kit is supplied with each Asena® Gateway Workstation to assist with mounting of the device onto hospital equipment rails. When installed, the Asena® Gateway Workstation will mount to rectangular rails. Locate the mounting rails at the bottom and top of the vertical extrusion in order to fully support the Workstation on the hospital equipment rails. Adjust the position of the mounts to match the spacing between the equipment rails and tighten the knobs to secure the Workstation in place. See Section on Mounting the Asena® Gateway Workstation for fitting of the Mounting Kit

Warning: Any rail system for supporting medical devices must comply with BSEN 12218:1999. Ensure the rail is capable of supporting a fully loaded Asena® Gateway Workstation (see Product Specifications) prior to mounting.

The Asena® Gateway Workstation has been designed to minimise the exposure of mating surfaces and all connectors to fluid ingress from leaking fluid bags and infusion lines mounted above and on the device. Mount the Asena® Gateway Workstation so as to minimise the collection or pooling of fluid in the device.

Warning: Do not orientate the Asena® Gateway Workstation with the mains inlet or outlets exposed in the event of a spill.

Mobile Trolley Mounting

Use the mounting kit supplied with the Asena® Gateway Workstation to mount the device on a mobile trolley. For stability, when moving a trolley mounted Asena® Gateway Workstation between locations the following guidelines should be followed:

1. Remove all unnecessary fittings and handle the Asena® Gateway Workstation with care during any transportation.
2. Ensure IV fluid bags weighing no more than 2 kg are suspended from the adjustable height poles, and that the pole is in the lowest position possible.

Warning: Do not overload the trolley. To ensure stability follow the guidelines given in the Product Specification section.

Warning: The Asena® Gateway Workstation should not be fitted to any other mobile pole or drip stand unless the stability and strength of the whole assembly has been evaluated to EN60601-1.

General Precautions

Users of the Asena® Gateway Workstation should read all instructions in this manual before using this medical device.

If this equipment is dropped, subjected to excessive moisture, humidity or high temperature, or otherwise suspected to have been damaged, remove it from service for inspection by a qualified service engineer. When transporting or storing the device, use original packaging where possible, and adhere to temperature, humidity and pressure ranges stated on page 12 and on the outer packaging.

An explosion hazard exists if the instrument is used in the presence of flammable anaesthetics. Exercise care to locate the unit away from any such hazardous sources.

An electrical shock hazard exists if the unit's casing is opened or removed. Refer all servicing to qualified service engineer.

When connected to an external power source, a three-wire (Live, Neutral, Earth) supply must be used. If the integrity of the external protective conductor in the installation or its arrangement is in doubt, the equipment should not be used.

This equipment emits a certain level of electromagnetic radiation that is within the levels specified by EN60601-1-2. If however, the unit interacts with other equipment, measures should be taken to minimise the effects, for instance by repositioning or relocation.

This equipment is protected against the effects of external interference, including high energy radio frequency emissions, magnetic fields and electrostatic discharge (for example, as generated by electrosurgical and cauterising equipment, large motors, portable radios, cellular telephones etc.) and has been tested to EN60601-1-2.

Do not open the RS232/Nurse Call protective covering when not in use. Electrostatic discharge (ESD) precautions are required when connecting RS232/ Nurse Call. Touching the pins of the connectors may result in ESD protection failure. In order to prevent any potential failure generated by ESD close to or above 15kV, it is recommended that all actions must be taken by appropriately trained personnel and the pump should not be attached to the patient when connecting RS232/Nurse Call.

The Asena® Gateway Workstation features an optional radio frequency IEEE 802.11b Wireless Local Area Network interface (RF card). When fitted, the Asena® Gateway Workstation must emit electromagnetic energy in order to perform its intended function. Nearby electronic equipment may be affected.

The Asena® Gateway Workstation is a Class B device. When the Asena® Infusion Pumps are attached and operational, the system remains a Class B system.

The Asena® Gateway Workstation is suitable for all establishments, including domestic establishments including those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.

Portable and mobile RF communications equipment can affect nearby medical electrical equipment.

Data Communication Interfaces

The user should be familiar with the data communications interfaces available on the Asena® Gateway Workstation before attempting to connect the device to client / server systems. Erroneous connection of data communication cables will not damage the device, but may cause the Asena® Gateway Workstation to operate incorrectly until the error is fixed.

Caution: Electrostatic Discharge (ESD) precautions are required when connecting the data communications cables to the Asena® Gateway Workstation. Avoid touching the pins of the connectors as this may result in an ESD protection failure.

Nurse Call Interface

A nurse call interface is provided which is activated whenever any Asena® Infusion Pump attached to the Workstation enters an alarm or warning condition, and stops when the condition is cleared on the pump. The Nurse Call Interface may be connected to operate in a normally open or normally closed contact position. Verify the Nurse Call is automatically activated each time the Asena® Gateway Workstation is switched on.

Caution: If the Nurse Call Interface fails to operate when the Asena® Gateway Workstation is switched on, suspect a fault with the interface. Remove the Asena® Gateway Workstation from service and contact a qualified service engineer.

Barcode Reader Interface (where fitted)

A barcode reader may be attached to the Asena® Gateway Workstation. The interface provided by the Asena® Gateway Workstation supplies power and a serial data connection to the barcode reader. The barcode reader is configured to support EAN type barcodes.

4 Port RS232 Serial Interfaces (where fitted)

The Asena® Gateway Workstation allows for the connection of up to four serial RS232 devices (three when the Barcode reader is in use). This electrically isolated interface permits Asena® Infusion Pumps with RS232 ports that are not compatible with the MDI tile interface, and other manufacturer's medical devices to be integrated into the Workstation.

Standard RS232 Serial Interfaces (where fitted)

A second, electrically isolated serial interface is also provided on the Communications boards.

Ethernet Interfaces (where fitted)

The Asena® Gateway Workstation may be used on a 10 Base-T/100 Base-Tx switched LAN. A DHCP client service allows the use of either fixed or dynamic network addressing of the Asena® Gateway Workstation. Similarly, a DNS client is provided. Configuration of these client services is through the Web Service. The Ethernet connection to the Workstation is electrically isolated.

Wireless Ethernet Interface (where fitted)

The Asena® Gateway Workstation may be used with an IEEE 802.11b 2.4 GHz wireless LAN. SSID wireless group selection is supported, as is data encryption through the use of 128 bit WEP keys. Configuration of the Wireless Ethernet Interface is through the Web Service.

The integrated diversity dipole antenna is built into the wireless LAN PCMCIA card.

Auxiliary Interface (where fitted)

Where the use of a single, large Asena® Gateway Workstation is not practical, two smaller Asena® Gateway Workstations may be linked together to behave as a single Gateway Workstation. To link the Gateway Workstations:

1. Ensure that only one Gateway Workstation is fitted with the Communications Upgrade and connected to the external client.
2. Link the two Asena® Gateway Workstations together using a standard CAT5 Ethernet cable inserted into the Auxiliary connector on the each Gateway Workstations.
3. The infusion data from each Gateway Workstation will be automatically integrated forming a single connection to the external client

Caution: The System Fault Indictor will be activated if any device other than an appropriately configured Asena® Gateway Workstation is fitted into the Auxiliary Connector.

Data Access

The Asena® Gateway Workstation retains all internal infusion data in an XML representation; this data is translated by applications on the Gateway into the appropriate format for the external client. Access to this data will depend upon the software applications installed on the Asena® Gateway Workstation.

Data confidentiality, integrity, accountability and dependency are managed through connection specific software applications operating on the Asena® Gateway Workstation. Refer to the Web Service Help Utilities, 1000CH00017, for specific information on the software available.

Web Service

The standard external interface on Asena® Gateway Workstation is the Web Interface. This is hosted by a Web service available and permits:

- Configuration of all interfaces and software.
- Display of all current infusion data
- Viewing internal event logs generated by the Asena® Gateway Workstation
- Access to help utilities for the software installed.

To access the Web Service connect to the Asena® Gateway Workstation using a standard web browser such as Microsoft Internet Explorer. The factory default IP address of the Asena® Gateway Workstation is 192.168.1.1; the HTTP server operates on Port 80 of the Workstation.

Caution: The Asena® Gateway Workstation should only be configured through the Web Service provided. Any attempt to access the operating system, modify any system or applications files, change registry settings or install software not licensed by ALARIS Medical UK Ltd., may cause the Asena® Gateway Workstation to operate incorrectly.

Operation of Asena® Gateway Workstation

Switching On

1. Connect the AC power cord from the mains supply to the IEC inlet socket on the Workstation
2. Verify the AC Power indictor is illuminated.
3. Depress the ⏻ key once to switch the Asena® Gateway Workstation on.
4. Verify the Workstation emits a brief audible tone
5. Verify the Fault indicator illuminates briefly and is then extinguished
6. Verify the Alarm Location Beacon illuminates red then amber and then is extinguished (where fitted)
7. Verify the ON Status indictor is illuminated
8. '**A**' and '**B**' Status indicators will flash (only applicable when the optional communications upgrade is fitted - options 2 and above)

After initially switching on the Asena® Gateway Workstation, any services and applications running on the device may take up to 30 seconds to become fully operational.

Caution: If any of the verification checks fails when the Asena® Gateway Workstation is switched on, suspect a fault. Remove the Asena® Gateway Workstation from service and contact a qualified service engineer.

Switching Off

Depress the ⏻ key and hold for 3 seconds to switch the Asena® Gateway Workstation off.

Resetting the Workstation

In the unlikely event that the Asena® Gateway Workstation needs to be reset, depress and hold the ⏻ key for at least 3 seconds until the On Status Indicator is extinguished, release the key then depress again to switch the Workstation back on.

Caution: If after resetting the Asena® Gateway Workstation it still fails to operate correctly, remove the device from service and contact a qualified service engineer.

Fitting a Pump

1. Holding the pump horizontally, push the pump into the MDI tile. If correctly positioned, the rotating cam will "click" into position on the rectangular bar, and the mains outlet will slot into the inlet on the pump. Ensure that the cam lever is in the return position.
2. Check that the AC Power indictor on the pump is illuminated. Neither AC Power nor data communications will be available until the pump is correctly located on the MDI tile.

Caution: Ensure that the pumps are fitted in accordance with the pump Directions for Use.

Removing a Pump

1. Holding the pump with both hands, push the release lever on the right hand side of the pump backwards.
2. Keeping the lever pushed back, pull the pump horizontally towards you.
3. Check that the red LED indicator on the MDI tile is extinguished after removal of the pump.

Caution: If the indicator in the MDI tile is illuminated when no infusion pump is attached to the MDI tile, suspect a fault with the MDI tile. Remove the Asena® Gateway Workstation from service and contact an approved service engineer.

Mounting the Asena® Gateway Workstation

Warning: Installation of these mounting kits should only be performed by an approved service engineer.

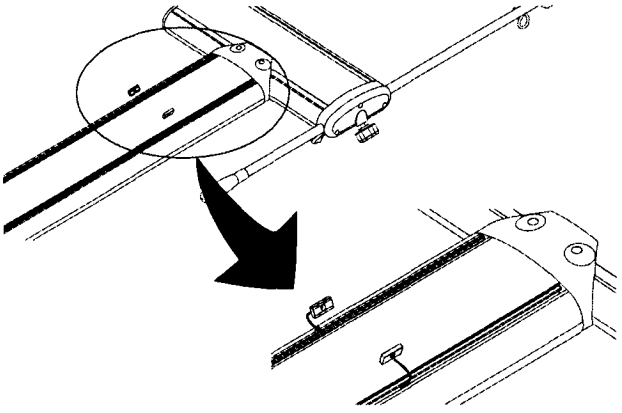
These mounting kits are suitable for mounting the Asena® Gateway Workstation to hospital equipment rails or for trolley mounting. Each fitting kit comes with two sizes of spacers (25 mm and 80 mm) depending on whether the Asena® Gateway Workstation is to be (i) fitted flush with, or (ii) stand off of the equipment rails. The choice will depend upon the space available behind the equipment rails. Assess the appropriate choice of spacer prior to fitting the mounting kit.

The distance between each mounting bar for a three MDI tile high base Asena® Gateway Workstation cannot be adjusted. Therefore, if this distance does not exactly match the distance between your equipment rails fit the spacer mounting kit (1000SP00192) instead on the lower mount.

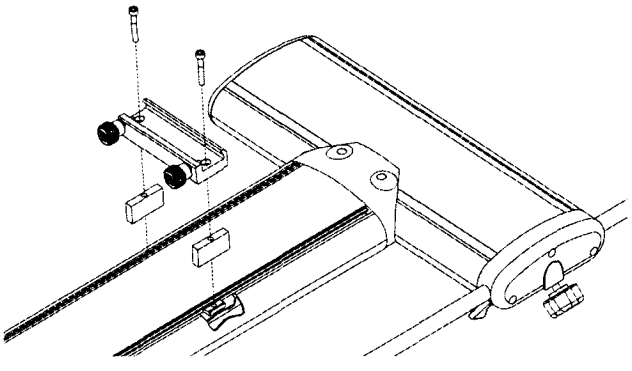
Fitting of Mounting Kit (1000SP00191)

Ensure that the Asena® Gateway Workstation is disconnected from the AC power supply before fitting the mounting kit.

1. Place the Asena® Gateway Workstation face down on a flat surface; ensure that the surface is clean and will not scratch or damage the Workstation. If the Workstation is fitted with a horizontal piece with bag hangers care must be taken not to rest the weight of the device on the hooks. In this case, either rotate the hooks to point upwards or position the Workstation so that the bag hangers overhang the end of the table or bench.
2. Disassemble the mounting kit and drop the two square nuts into each channel in the rear of the Workstation. The nuts should be positioned in the channels so that the two grooves of the square nut are facing upwards.



3. Use a screwdriver or similar pointed tool to slide the square nuts along the channels resting parallel to the required position. Fit the appropriate mounting blocks over the top of the square nuts and place the mounting bar across the two blocks, ensuring that the screw holes line up each side.

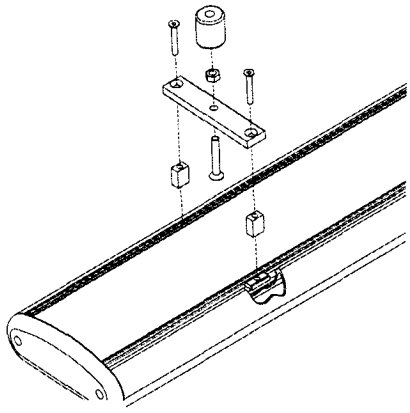


4. Fit the two cap head bolts through the mounting bar, line the assembly up and turn the bolts until the threads engage. Tighten the bolts ensuring that the mounting kit is level and secure.

Fitting of Mounting Kit (1000SP00192)

Fit the upper mounting kit first.

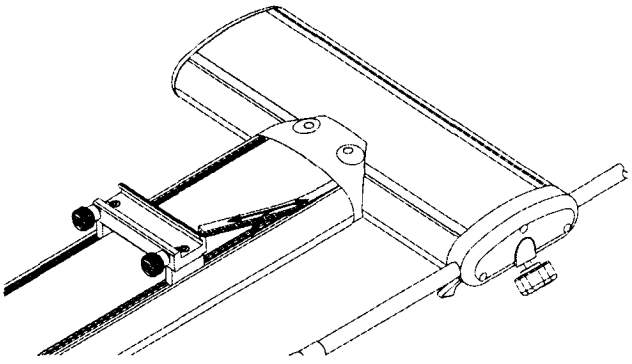
1. Disassemble the spacer mounting kit and drop the two square nuts into each channel in the rear of the Workstation. The nuts should be positioned in the channels so that the two grooves of the square nut are facing upwards.
2. Use a screwdriver or similar pointed tool to slide the square nuts along the channels resting parallel to the required position. Assemble the central countersunk hexagonal bolt onto the mounting bar and secure in place. Screw on the nylon spacer.
3. Fit the appropriate mounting blocks over the top of the square nuts and place the mounting bar across the two blocks, ensuring that the screw holes line up each side.



4. Fit the two cap head bolts through the mounting bar, line the assembly up and turn the bolts until the threads engage. Tighten the bolts ensuring that the spacer mounting kit is level and secure.

For Both Mounting Kits

1. Cut a length of sealing cord to fill the channel between the mounting kit and the end caps. Press one end of the sealing cord into the channel and carefully stretch the cord pressing it into place. Repeat the operation for the remaining sections of channel.

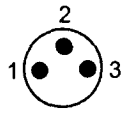


Data Communications Interface Specifications

Nurse Call Interface

Connector Type: Bindek 09 0978 00 03
Cable Type: N/A
Isolation: 1.5kV
Rating: 30V/1A

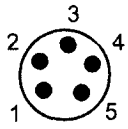
	Description
Pin 1:	NC_COM
Pin 2:	NC_NC
Pin 3:	NC_NO



Barcode Reader Interface (where fitted)

For use with ALARIS® supplied barcode reader only.
Connector Type: Bindek 09 0998 00 05
Cable Type: N/A

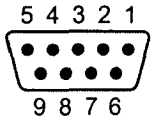
	Description
Pin 1:	+5V
Pin 2:	TxD
Pin 3:	GND
Pin 4:	RxD
Pin 5:	SENSE



4 Port Serial RS232 Interface (where fitted)

Connector Type: D type - 9 pin (female)
Cable Type: Standard RS232 Cable: Length as required [1]
Isolation: 1.5kV
Data Rate: 57.6k baud

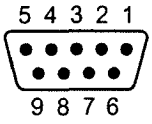
	Description
Pin 1:	N/C
Pin 2:	RXD
Pin 3:	TXD
Pin 4:	N/C
Pin 5:	GND
Pin 6:	N/C
Pin 7:	RTS
Pin 8:	CTS
Pin 9:	N/C



Serial RS232 Interface (where fitted)

Connector Type: D type - 9 pin (female)
Cable Type: Standard RS232 Cable: Length >1.5m [2]
Isolation: 1.5kV
Data Rate: 57.6k baud

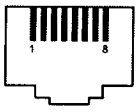
	Description
Pin 1:	N/C
Pin 2:	RXD
Pin 3:	TXD
Pin 4:	N/C
Pin 5:	GND
Pin 6:	N/C
Pin 7:	RTS
Pin 8:	CTS
Pin 9:	N/C



Ethernet Interface (where fitted)

Connector Type: RJ45
Cable Type: CAT5e Ethernet Cable: Length >1.5m [2]
Isolation: 1.5kV
Data Rate: 10/100Mbps

	Description
Pin 1:	TxD+
Pin 2:	TxD–
Pin 3:	RxD+
Pin 4:	N/C
Pin 5:	N/C
Pin 6:	RxD–
Pin 7:	N/C
Pin 8:	N/C



Wireless Ethernet Interface (where fitted)

Antenna:
Type: Integrated Diversity Dipole Antenna

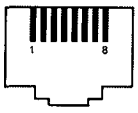
RF Card:
Frequency Range: ISM Band 2.4 to 2.4897MHz
Modulation: CCK
Available
Transmit Power: 100mW (20dbm)
Certification of the RF card:

The wireless LAN PCMCIA card installed in the Asena® Gateway Workstation is in compliance with the essential requirements and other relevant provisions of Radio and Telecom Terminal Equipment Directive 1999/5/EC.

Auxiliary Interface (where fitted)

Connector Type: RJ45
Cable Type: CAT5e Ethernet Cable: As required [3]
Isolation: 1.5kV

	Description
Pin 1:	Tx+
Pin 2:	Tx–
Pin 3:	Rx+
Pin 4:	N/C
Pin 5:	N/C
Pin 6:	Rx–
Pin 7:	N/C
Pin 8:	N/C



NOTES:

[1] Assumes client equipment is medical electrical equipment in compliance with EN 60601 and inside the patient environment.

[2] Assumes client equipment is non-medical equipment and outside of the patient environment; may be less than 1.5m if the client equipment is medical electrical equipment in compliance with EN 60601.

[3] Asena® Gateway Workstation may be used anywhere inside the patient environment.

ALARIS MEDICAL SYSTEMS | Medication Safety at the Point of Care™

Service Record Number: _____

ASENA GS GH CC TIVA PK TEST DATA SHEET

Customer:		**Date :** / /	
Model:	**Serial Number:**	**S/w**	**Safety S/w**

ACCESS CODE	DESCRIPTION (√=Pass and n/a not applicable)					
167	UUT TO MASTER S/N _____		MASTER TO UUT		N/A	
611	Cold Start Confirmed		Loaded Default Values Confirmed		PK (only) Do 612, then 401, load AUS Data Set. CRC =	

243

Syringe Size Cal

Cal 1 12.00 mm _____mV

Cal 2 32.00 mm _____mV

Linear Position

Cal 1 17mm _____m V

Cal 2 72mm _____m V

Cal 3 127mm _____m V

Force Beam Occlusion Cal

Preforce _____done

0kg _____mV

3kg _____mV

10kg _____mV

Cal kit # _____

CC Line Pressure n/a _____

Battery Calibration

Time (Hrs : min)

Cal 1 25mmHg (3.3 kPa) _____ mV 0 – 3 Hours **CHRGCAP** _____ mAh ____:____

Cal 2 500mmHg (66.7 kPa) _____ mV 4:15 – 10 Hours **DISCHR** _____ mAh ____:____

Cal 3 1000mmHg (133.3 kPa) _____ mV **VOLT** _____ ____:____

123	**Test Sequence - Complete Full Test** **Perform LDT < +/- 1%** **Perform PFB +/- 0.2Kgf**	
Settings	**251 Clock set** _____	**376 Service date set > 12months** _____ **Use Log CLEAR** _____

Real Time Test

Linear Speed Test

200ml pump set to BD 15mm
distance time (2:27.01 to 2:30.59) _____:_____ min:sec

Occlusion Test

100ml pump set to BD L – 3
3.0kg +/-0.3kg ____:____kg

Line Pressure Readings

(if appl) Note access code fully dedicated "301" semi dedicated "302" n/a _____

25mmHg (+/- 5mmHg)	500mmHg (+/- 40mmHg)	1000mmHg (+/- 50mmHg)
3.3 kPa _____ mmHg	66.7 kPa _____mmHg	133.3kPa _____mmHg

ALARMS SYR _____ PLGER _____ NEOI _____ DEC _____ A/C _____ KVO / STOP _____ LINE PRES CC _____

LABELS Fit service stickers date and sign _____ If cold start done, fit " protocols cleared due to recalibration " sticker _____

Electrical safety test Class 1 Type CF Electrical Safety (AS/NZ 3551-2004)			
	Insulation	>10MΩ	MΩ
	Prot. Earth	<300 mΩ	mΩ
	I LeakageNO	<1000μA	μA
	I Leakage	<500 μA	μA

RECOMMENDED UPDATES: already installed = √ other write "installed "

SB0005	8EL19 R14 R15 and 8EL22 R1 changed to 39k PB2 & DE2 error		AUS/NZ	1SP593 KIT Adhesive foot – Replacement of black RIVET TYPE	
SB0006	Replace white case seal with new black type 1000me00311		AUS/NZ	1ME1198 Declutch Gear Replace, new black type.	
AUS/NZ	1LB352 keypad replaced GH (09562 - 19536) CC (01712 – 03670)		AUS/NZ	Guardrails s/w required, pcb 8EL10 issue 7 must be installed.	
AUS/NZ	1SP589 Pole Clamp update GS (08510 – 09976),GH (09562 – 19536), CC (01712 – 03670)				

TEST PERFORMED BY: _____ DATE:_____

Print Name

Product Specification

Electrical:

Protection Against Electrical Shock: Class I Type CF
Supply Voltage: 115/230V, ~50/60Hz
Rating: 500VA (nominal)
Fuses: 2xT5 Amp Anti-surge (5x20 mm)
Mains Outlet:
to MDI Tile: 115/230V, ~50/60Hz, 20VA
to second Gateway Workstation: 115/230V, ~50/60Hz, 360VA

Battery

Type: Nickle Metal Hydride
Charge time: 16 Hours
Operating time: 20 minutes

Web Service (where fitted):

Default IP Address: 192.186.1.1 Port 80
Web Browser: Internet Explorer Version 6; Windows XP or 2000 Operating System

Environmental

	Operating	Transport and Storage
Temperature:	+5°C - +40°C	-20°C - +65°C
Humidity:	20% - 90%	15% - 95%
Atmospheric Pressure:	700 - 1060hPa	500 - 1060hPa

Classification:

Continuous Operation

Regulatory Compliance:

Certified to comply with EN60601-1, EN60601-1-1, EN60601-1-2, EN60601-1-4.

CE

Physical:

Configuration	Bag Supports	Height (mm)	Width (mm)	Depth (mm)	Weight Empty (Kg approx.)	Trolley Compatible
8203UNI30	-	528	170	155	5.65	✓
8203UNI32	2	663	348	155	8.37	✓
8203UNI33	3	663	514	155	9.51	✓
8203UNI34	2/2	663	710	155	10.85	✓
8203UNI50	-	742	170	155	7.20	✓
8203UNI52	2	944	348	155	9.92	✓
8203UNI53	3	944	514	155	11.06	✓
8203UNI54	2/2	944	710	155	12.40	✓
8203UNI70	-	1005	170	155	11.20	✓
8203UNI72	2	1179	348	155	13.92	×
8203UNI73	3	1179	514	155	15.06	×
8203UNI74	2/2	1179	710	155	16.40	×

Maintenance

A comprehensive service manual containing servicing and testing information is available for this equipment. It can be ordered from your ALARIS® authorised distributor (Technical Service Manual part number 1000SM00015).

Routine Maintenance Procedures

To ensure that this Asena® Gateway Workstation remains in good operating condition, it is important to keep it clean and carry out the routine maintenance procedures described below. All servicing should be performed by a qualified service engineer with reference to the ALARIS® Technical Service Manual for this product (Technical Service Manual 1000SM00015).

Warning: If the Asena® Gateway Workstation is dropped, damaged, subject to excessive moisture or high temperature, immediately take the Asena® Gateway Workstation out of service for examination by a qualified service engineer.

Interval	*Routine Maintenance Procedure*
When loading pumps	Check that each pump is properly located on its electrical connectors and is mechanically locked into position.
When removing pumps	Check that the red LED turns OFF when the pump is removed. If the LED stays ON, the Asena® Gateway Workstation should be serviced by a qualified service engineer.
As required	Thoroughly clean external surfaces of the equipment before and after prolonged periods of storage.
12 Monthly	• Inspect AC outlets, communication connectors and the AC inlet for damage. • Perform electrical safety checks. The complete unit leakage current must be measured. If more than 500µA the equipment should not be used, but should be serviced by a qualified service engineer.

Disposal

The Asena® Gateway Workstation should be disposed of taking environmental factors into consideration. Do not send back to manufacturer. All components can be safely disposed of in the normal manner.

Replacing the AC Fuses

If the pumps fitted to the Asena® Gateway Workstation continually display the battery symbol and the AC power indicator light does not illuminate when the pump is connected to the AC power supply and switched ON, suspect that either the power supply fuse in the AC power mains plug or, the mains fuses of the Asena® Gateway Workstation have blown.

First check the power supply fuse in the AC plug, if the AC power indication light does not illuminate proceed to check the Asena® Gateway Workstation mains fuses. Switch the power OFF and disconnect the Asena® Gateway Workstation from the AC power supply.

Unscrew the fuse holder caps, remove and check both fuses. If a fuse has blown, fit a new fuse of the type and rating stated below. Do not exceed the current rating specified. If the mains fuse blows again after a short period, or the fuse in the AC power lead fails again, take the Asena® Gateway Workstation out of service for examination by a qualified service engineer.

Important: If the fuses continue to blow, suspect an electrical fault and have the Asena® Gateway Workstation and power supply checked out by a qualified service engineer.

Cleaning and Storage

Periodically clean the Asena® Gateway Workstation by wiping over with a lint free cloth lightly dampened with warm water and a standard disinfectant / detergent solution.

If the Asena® Gateway Workstation is to be stored for an extended period it should be first cleaned. Store in a clean, dry atmosphere at room temperature and, if available, employ the original packaging for protection.

Important: Before cleaning always switch the Asena® Gateway Workstation OFF and disconnect from the AC power supply. Never allow liquid to enter the casing and avoid excess fluid build up on the Asena® Gateway Workstation. Do not use aggressive solvents or abrasive cleaning agents as these may damage the exterior surface of the accessory. Do not steam autoclave, ethylene oxide sterilise or immerse this Asena® Gateway Workstation in any fluid.

Please contact your local ALARIS Medical Systems® affiliate office or distributer for full details on approved cleaning agents.

Service Contacts

For service contact your local ALARIS Medical Systems® Affiliate Office or Distributor. ALARIS Medical Systems® Service Centre Addresses:

AE
ALARIS Medical Systems Middle East Office,
PO Box 5527,
Dubai, United Arab Emirates.
Tel: (971) 4 28 22 842
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AU
ALARIS Medical Australia Pty Ltd,
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ALARIS Medical Canada, Ltd, 235 Shields Court,
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Document History

Revision	CO Number	Date	Description of Change/Changed by
1	5437	01/10/04	Initial release - Martin Burnett

Warranty

ALARIS Medical Systems, Inc. (herein after referred to as "ALARIS Medical Systems") warrants that:

(A) Each new infusion instrument (pump, controller or peripheral instrument) is free from defects in material and workmanship under normal use and service for a period of two (2) years from the date of delivery by ALARIS Medical Systems to the original purchaser.

(B) Each new accessory is free from defects in material and workmanship under normal use and service for a period of ninety (90) days from the date of delivery by ALARIS Medical Systems to the original purchaser.

(C) Each Mains Cable, Battery, Flow Sensor (ECD) and non-disposable probe is free from defects in material and workmanship under normal use and service for a period of ninety (90) days from the date of delivery by ALARIS Medical Systems to the original purchaser.

(D) Each new Thermometer is free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of delivery by ALARIS Medical Systems to the original purchaser.

If any product requires repair during the applicable warranty period, the purchaser should communicate directly with its local ALARIS Medical Systems® service centre to determine the appropriate service facility. Except as provided otherwise in this warranty, repair or replacement will be carried out at ALARIS Medical Systems' expense. The product requiring service should be returned promptly, properly packaged, and postage prepaid by purchaser. Loss or damage in return shipment to ALARIS Medical Systems shall be at purchaser's risk.

In no event shall ALARIS Medical Systems be liable for any incidental, indirect or consequential damages in connection with the purchase or use of any ALARIS Medical Systems® product. This warranty shall apply solely to the original purchaser. This warranty shall not apply to any subsequent owner or holder of the product.

Furthermore, this warranty shall not apply to, and ALARIS Medical Systems shall not be responsible for, any loss or damage arising in connection with the purchase or use of any ALARIS Medical Systems® product which has been:

(A) repaired by anyone other than an authorised ALARIS Medical Systems® service representative;

(B) altered in any way so as to affect, in ALARIS Medical Systems' judgement the stability or reliability of the product or has had the product's serial or lot number altered, effaced or removed;

(C) subjected to misuse or negligence or accident; or

(D) improperly maintained or used in any manner other than in accordance with the written instructions furnished by ALARIS Medical Systems.

This warranty is in lieu of all other warranties, express or implied, and of all other obligations or liabilities of ALARIS Medical Systems, and ALARIS Medical Systems neither assumes nor authorises any representative or other person to assume for it any other liability in connection with the sale of ALARIS Medical Systems® products.

ALARIS MEDICAL SYSTEMS DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

(1000PB01391 Iss 2)

Patent, Copyright and Trademarks

Manufacturers Patent Notice -

This docking station is designed and manufactured in the U.K. by ALARIS Medical UK Ltd. ALARIS Medical UK Ltd reserves the right to alter product specifications without notice.

AU Patent No. 144,124; CA Patented/Breveté 90,905; GB Patent No. 2,083,562; IE Patent No. D13002; JP Patent No.登録第1,117,998号; U.S. Patent No. 6,593,528; 6,407,335.

Other patents pending.

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